

The TECHNOLOGY DEPARTMENT

# CHEMICAL AGE

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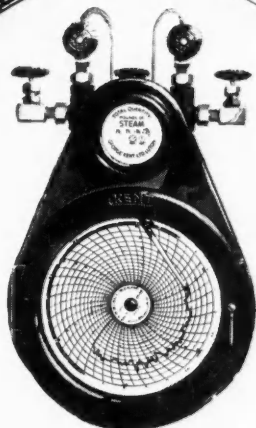
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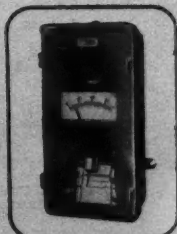


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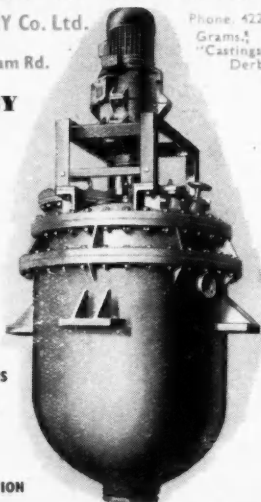
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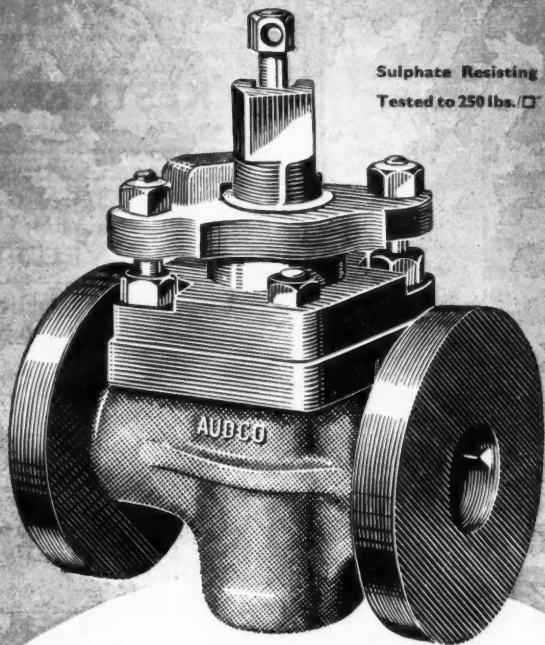
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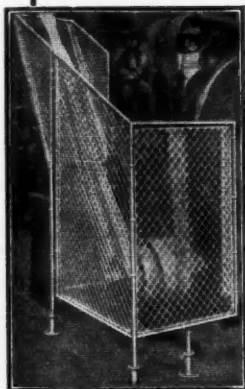


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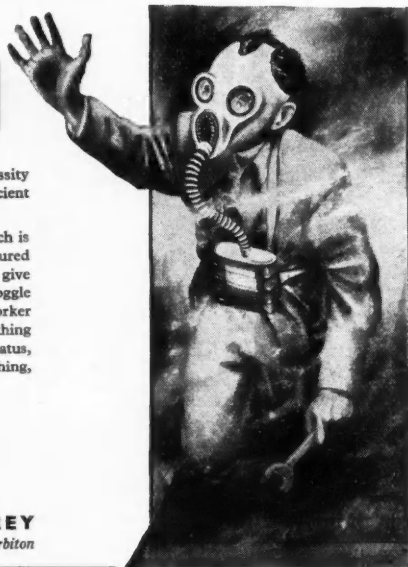
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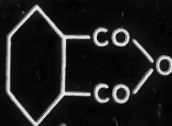
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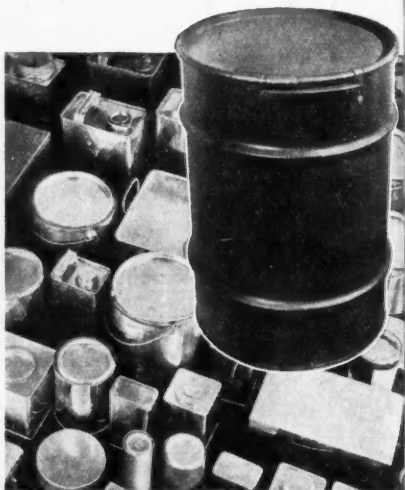
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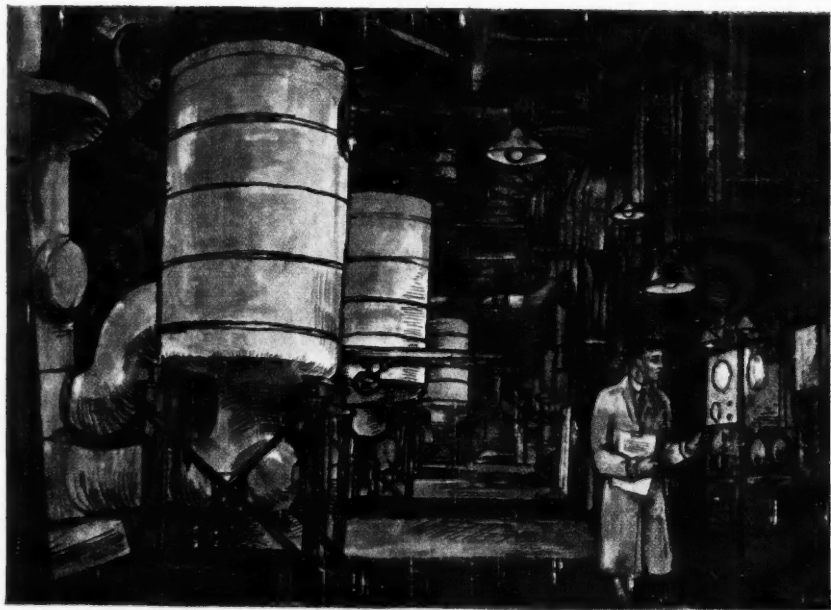
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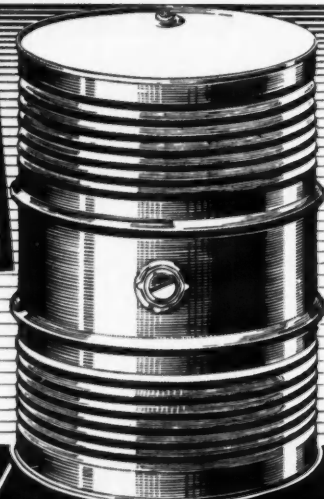
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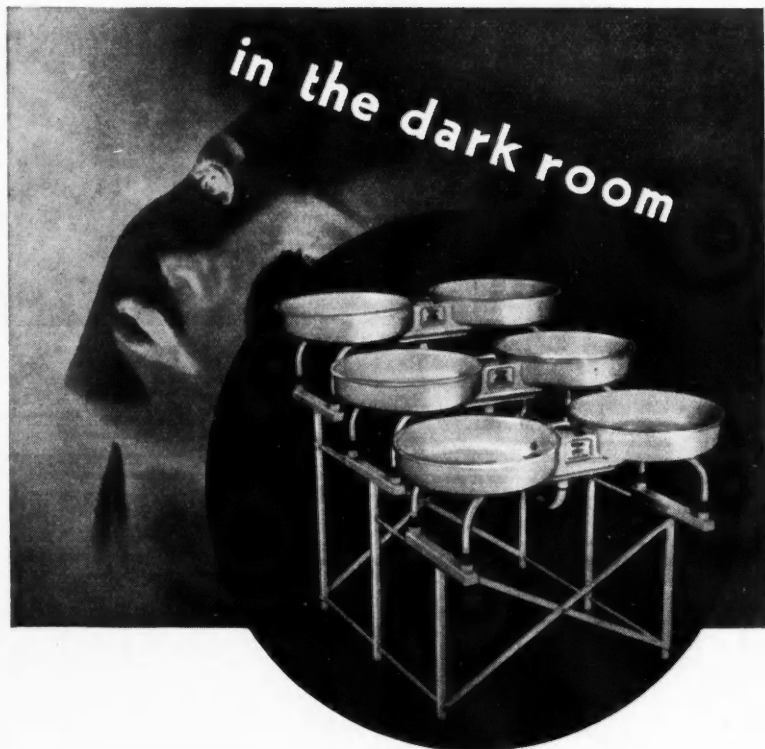
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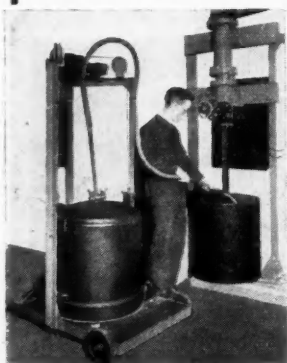
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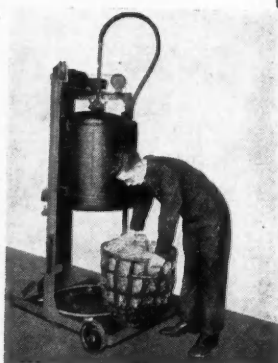
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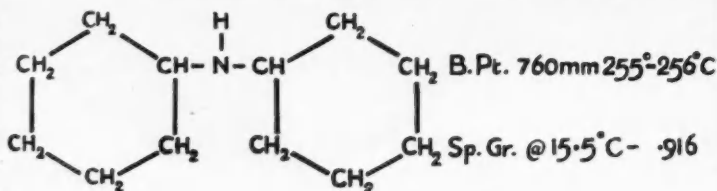
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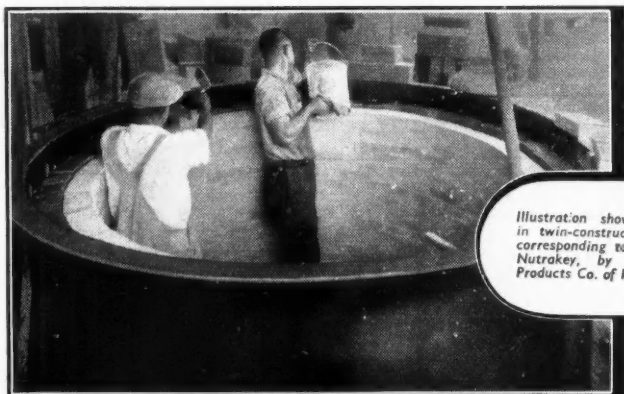


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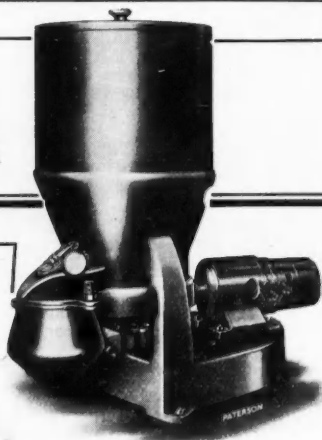
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16 April 1949

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## New View of Research

IT is a frequent complaint that invention to-day proceeds in small and insignificant stages, that the opportunities for revolutionary, epoch-making discoveries are almost non-existent; or, if they exist, they are seldom or never grasped. Study of the patent field, more particularly, emphasises the attention paid to minutiae, the little streamlets, and the comparative disregard of the Amazons and Mississippis, which may debouch on new worlds. The metaphor pays insufficient regard, perhaps to the fact that in addition to the vast number of trifling improvements there are from time to time some that undoubtedly merit the term great; and the small steps forward are by no means to be despised. In the aggregate they are the main source of great rivers.

Bearing in mind the almost exaggerated respect which is accorded to research to-day, it would be reasonable to expect that all possible encouragement, short of adulation, would be given to the potentially great inventors; that their ideas, however startling and revolutionary in the scientific sense, would be welcomed and their consequences developed to the utmost.

It is therefore not a little disturbing to find that a scientist of the standing of Auguste Lumière, of Lyons, is strongly of opinion that there is no such welcome and encouragement: on the contrary, he maintains there is still rampant the old policy of opposition and frustration of new ideas,

with which the pioneers and discoverers of old were treated. In a brief but remarkable article on "La recherche scientifique et le conformisme" (*Chim. et Ind.*, 1949, 61, 280-281, March) he recalls the melancholy early history of Pasteur, and in this context he endeavours to unfold the rather dismal thesis that the path of the pioneer is still cumbered not only with the difficulties naturally inherent in his work but still more by those unnecessarily created by rigid dogma, conformism, and narrow regard for the *status quo*. Lumière indeed propounds some dark sayings, and is probably unduly pessimistic; yet it is extremely salutary at times to review the position from his point of view.

The creative pioneering genius is more than ever needed to-day, and while many will urge that this is true much more in politics and sociology than in the strictly scientific and technical fields, it remains necessary apparently to include the whole realm of human study in a current review. Vigilance is still vitally essential to ensure that research, especially of the fundamental kind, has full liberty and stimulus to expand without let or hindrance.

The French writer is somewhat scathing in some of his criticism, in particular of the university atmosphere, and speaks of "l'esprit des maîtres de la science qui continuera à être intoxiqué par les enseignements dogmatiques de l'Université." This is too sweeping; and it



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seems also a little unjust to complain that, during the past ten years, little or nothing of sensational value has appeared in any French journals or proceedings of learned institutions. Later, he says that it is not in distributing prizes or medals to authors of scattered dust of small works of little importance that the academies will really advance research, but in refraining from discouragement of those who seek and discover new truths.

The most favourable and fostering environment for these, he thinks, includes the elements of security in every sense, a renunciation of the "glorious isolation" idea, and close contact with general industry and technology. Lumière says these and other essentials are far from being adequately provided.

He is probably on sounder ground when he speaks of excessive dirigisme (control) and the heavy and cumbersome bureaucratic machine which governs research in France and overwhelms it with forms and regulations (fait ployer sous la paparaserie). A sweeping reform here is long overdue. Far from adapting itself to the rising spirit of initiative and freedom which distinguishes the present it persists in trying to impose its thralldom on the activities of the mind. That is not peculiarly a French problem.

Whatever enmity between science and dogma in any shape may have prevailed

in the past, it would be reasonable to suppose that peoples and governments to-day would be eager to give science full sway and every possible support, for more or less obvious reasons of ultimate self interest, despite a certain apprehension at times as to what might be the full consequences of such policy. Is this apprehension growing? Apart from the political stranglehold over all forms of thought, scientific or otherwise, which appears to be tightening in Eastern Europe—is there, in the more generous and freer atmosphere of the West, some lurking fear of further cataclysms if epoch-making discoveries are encouraged?

There may be a growing fear that science, so far from needing further encouragement, is already outstripping sociology, political thought, and philosophy and destroying some established values to produce acute maladjustment in the intellectual realm. If that is true, there arises a dilemma from which no escape is likely to come though an increase in State direction and the centralisation of research, regardless of the fact that the magnitude of some current projects demands massive support and equipment. Such problems are best resolved by the individual workings of the human conscience, which State action can never replace without disastrous consequences.



## NOTES AND COMMENTS

### Second Thoughts

**F**EW things speak more convincingly of the changes which events have compelled in Socialist and trades union views than the admission at the end of last week that hopeful plans to make a State monopoly of Imperial Chemical Industries, Ltd., as part of the next general election programme, have been firmly shelved. The news comes from Mr. Bob Edwards, general secretary of the Chemical Workers' Union, writing in the *Chemical Worker*, but the decision fairly certainly reflects realistic counsels in the quarters in which Sir Stafford Cripps's influence has chilled more than one ill-considered plan. The statement in the trade union journal records the decision on an earlier recommendation of a sub-committee of the national executive of the Labour Party, one of several sub-committees which have been busy debating projects for possible inclusion in another Socialist programme. This very definitely rejects the proposals relating to I.C.I., Ltd. Supporters who cherished this dream long before the unpalatable effects of nationalisation of the coal industry were even suspected are now being asked to accept instead "a general paragraph in the programme which asks for power to nationalise certain industries, including chemicals, in the event of the economic needs of the nation meriting such action." Strictly interpreted, in the light of what nationalisation has contributed to our economic needs so far, that should mean never.

### A Cautionary Tale

**B**EFORE the next demand is made for State monopoly of chemical industry—as it will be—all concerned will be well advised to digest the recollections a previous enterprise of a similar kind, which was offered last week by a more or less disinterested observer, Mr. James Ewing, chairman of the Bradford Dyers' Association, Ltd. He recalled the conspicuously unsuccessful record in its early stages of the British Dyes, Ltd., and its successor, the British Dyestuffs Corporation, formed substantially with Government finance after hostilities in 1914 had revealed the

impotence to which unlimited foreign competition had condemned the small British dyestuffs industry. That first experiment in Government direction in chemical production moved the late Sir Henry Sutcliffe Smith, chairman of the Colour Users' Association, to appeal to the Government to cut their losses, and to the directors of the corporation "to arrange that the corporation shall be managed by men who have been brought up in the industry." That advice was given in 1922; in 1925 it was taken. The Government liquidated its shareholding for part repayment in cash and the corporation became part of Imperial Chemical Industries, Ltd. Mr. Ewing has provided a very appropriate footnote to this cautionary tale, which has been so quickly forgotten. In 1913 Great Britain supplied only about 20 per cent of her own dyestuffs; to-day we find more than 90 per cent of all we need and maintain a great and valuable dyestuffs export trade. Would a Government monopoly have done so much?

### Two Controls Go

**W**HILE the "bonfire of controls" promised not long ago by the President of the Board of Trade has resembled the sullen smouldering of a mine tip rather than a carnival blaze, small conflagrations continue from time to time to lighten the fog arising from the great accretion of Statutory Rules and Orders. One such blaze last week signalled the unlamented passing of the Government regulation controlling the acquisition of white lead and titanium oxide, two of the prime needs of the paint industry, and, as regards titanium oxide, a material of growing importance in other promising new directions. The note from the Board of Trade, amplifying the news, errs on the side of optimism in observing that ordinary trading conditions are now established and that it remains only for the needy to contact suppliers. Lead oxide admittedly has for some time been sufficiently ample to have justified an individual bonfire of forms and directives, and the downward movement in lead prices have now produced a sympathetic reaction in the oxide. No buyer, however, pretends that titanium oxide is to be had as required. There is



active demand and the small initial output of one new plant at Grimsby (*THE CHEMICAL AGE*, 59, 157) could readily be taken up several times over. That source, however, is being rapidly expanded and the prospect is held out that within about four months total supplies will be equal to any normal demand.

### Burden Unrelieved

**T**HE evidence of apparent resignation to the continuance of unparalleled taxation burdens has in the past week singled out the 1949 Budget from practically all others. Such unwonted calm in the face of refusal by the Exchequer to pay any regard to all but one or two of all the urgent appeals for relief presented in recent months fairly certainly reflects a new frame of mind. Those sections of opinion unaffected by specious promises and the other tricks of political mass hypnotism know that substantial relaxation of State demands was virtually impossible while Government expenditure continue on its present vast scale. Silence on this occasion, far from signifying assent, has the character of the prelude to a storm, generated not by the effects but by the knowledge of the cause. Unbridled expenditure—which the most flourishing economy could hardly support—has reached the danger point. So, in 1949, as in 1948, national and local taxation promises to absorb 40 per cent of the country's entire income, and what is left may be insufficient to finance fully the further expansion of industries, which future "targets" render indispensable, or to sustain existing plant and programmes in a state fit to meet the heightened demands of the future. The urgent nature of that problem is admitted by Sir Stafford Cripps's temporary expansion from 20 to 40 per cent in the first year of the tax allowance for new industrial plant. That, momentarily, is a most needed aid, but it must be recognised that it is only a deferment, not a remission of the great tax burden which enforces high prices, aggravates wage demands, and unfits British industry to compete with the world.

### Economy Essential

**D**URING the coming year the Federation of British Industries and the many trade and professional associations

representing commerce will press increasingly for two major reforms. On the one side the cost of Government, national and local, must be drastically pruned. On the other, incentives to trade by the reduction of the profits tax and by the formulation of a firm policy in regard to purchase tax will be demanded. Retail trade over a wide field has been severely restricted because of uncertainties about changes in purchase tax, uncertainties which have become a seasonal hazard of a most unfair and unnecessary kind. In the wider field, no satisfaction has been given to the most urgent of all demands—for a reduction of Government expenditure. True, the Chancellor said that a Treasury circular had been issued to all departments to review again the expenditure likely to flow from the development of existing policies, so that it could be kept within bounds considered feasible. That is not enough. It is another Geddes axe that is needed in Whitehall. Staffs and spending there have swollen enormously and continue to swell. There, indeed, lies a great field for the direct exercise of the sort of harsh sternness that the Chancellor applies to taxpayers in general in this latest "no relief" Budget.

### Mineral Oil in Food

As mineral oils are completely devoid of nutritional value, the Minister of Food has made the Mineral Oil in Food Order, 1949, which became effective from April 9, prohibiting their use as an ingredient in the manufacture of food for sale to the public.

For some time past local authorities and the Ministries of Food and Health and the Department of Health for Scotland have been concerned both on medical and nutritional grounds with the growing practice of using paraffins in the preparation of food. Medicinal paraffin has, of course, its proper uses under correct supervision. Prolonged and regular consumption which may occur when it is used in the preparation of food, may, however, lead to deposits of the oil in certain organs of the body.

The regular consumption of liquid paraffin, whether medical or not, dissolves vitamin A (and its precursor carotene) and vitamin D, and inhibits the assimilation of these essential vitamins by the digestive system.



## Penicillin Techniques

### Analytical Chemists Review Progress

THE development of technique in relation to production of penicillin and to its study and estimation was reflected in the papers given in London last week before the Society of Public Analysts.

The applications of chromatography were the subject of two studies. Describing "A technique for paper chromatography using volatile solvents, with special reference to the estimation of penicillin in a mixture," P. B. Baker, M.P.S., F. Dobson and A. J. P. Martin, M.A., Ph.D., discussed a simple, direct method for the qualitative and quantitative examination of penicillin mixtures.

The process, requiring less than eight hours for completion, is based on the fact that the relatively stable hydroxamic acid derivatives of the various penicillins show different partition coefficients between isopropyl ether containing iso-propyl alcohol and phthalate buffer, at a given pH, and can, therefore, be separated by paper chromatography.

A novel and essential apparatus for this type of chromatography with volatile solvents was also described.

A direct, visible result is obtained by developing the chromatograms with dilute ferric chloride solution. A quantitative result may be obtained by extracting the iron complexes of the various hydroxamic acids with butyl alcohol, measuring the degree of extinction in a colorimeter and reading the penicillin units from a standard curve.

### Promising Uses

The application of the same technique to culture filtrates and similar process samples was described by J. W. Albans, B.Sc., A.R.I.C. The changes in composition that take place during fermentation and the use of the technique for examining fermentation variables, such as the composition of the medium, aeration, the use of precursors and the fermentation time, were shown.

Some confirmation of the existence of substances previously indicated by the microbiological chromatographic technique, but not yet characterised, was discussed. The construction of a large vessel for multiple assays was described and examples of the degree of reproducibility of the method.

The results obtained by the members of the Analysis sub-committee of the Ministry of Health Conference by their own interpretations of the method for the determination of benzyl penicillin by precipitation with *n*-ethylpiperidine, proposed by Sheehan, Mader and Cram, showed such wide variations that, after investigation, a modified

(Continued at foot of next column)

## Technical Education

### Big Building Programme

THE importance of technical education and the need to give it the fullest equipment were emphasised by Mr. George Tomlinson, Minister of Education, speaking at the jubilee meeting of the West Ham Municipal College, last week.

Between now and 1952, he said, the Government intended to carry out a technical school building programme "that should satisfy all needs that could be foreseen at present."

### Co-operation

Now plans to aid further education had been undertaken and the whole field had been surveyed by a national advisory council. Regional councils and academic boards had worked together to link the major technical colleges with each other and with industry.

The demand for technical education from industry and from the individual was greater than ever before. About one-quarter of a million students were being released by their employers for day-time training, compared with 170,000 in 1947 and 40,000 in 1938.

Another important aspect of technical education—the closer relationship of technical colleges and universities—was referred to by Mr. J. Wilson, principal of Birmingham Central Technical College, at the annual meeting of the Plastics Institute (Midlands Section).

Mr. Wilson said that instead of taking only London external degrees, he hoped that it would soon be possible for major technical colleges to grant their own degrees, such as B.Tech. or similar distinctions. He thought such a course preferable to the universities extending their technological departments at the expense of their true field of art, culture and pure science.

procedure was recommended. This was one of the factors discussed by C. R. Bond, M.Sc., F.R.I.C., who was chairman of the sub-committee concerned.

A number of samples have been examined by the proposed method and also for potency (biological), for total penicillins (iodometric), and the samples and *n*-ethylpiperidine precipitates have been examined for other penicillins (micro-chromatogram and infra red).

A study of the results showed that the precipitates obtained were not necessarily composed of the *n*-ethylpiperidinium salt of pure benzyl penicillin, but that at a high level, probably owing to a compensation of errors, a fair degree of accuracy may be attained.



## American Aid

### Impressive Total for U.K. Industry

THE Economic Co-operation Administration completed the first year of its existence at the beginning of this month, and during that period it has authorised the United Kingdom to procure food, fuel, raw materials and machinery valued at 1247.6 million dollars.

Britain's procurement authorisations thus comprised roughly a quarter of the 5000 million dollars which the U.S. Congress voted for the 16 countries and three occupation areas participating in the European Recovery Programme.

Among the commodities for which ECA procurement authorisations were issued to the United Kingdom up to and including March 28, were the following:—

Commodity	In Million Dollars
Fertilisers ... ..	0.8
Petroleum products ... ..	153.6
Copper ... ..	57.3
Aluminium... ..	48.9
Zinc ... ..	34.3
Lead ... ..	24.0
Industrial chemicals (other than alcohol) ... ..	1.8
Alcohol ... ..	9.0
Other ... ..	17.2
Iron and steel mill products ... ..	12.4
Non-metallic minerals ... ..	10.3
Metallic ores and concentrates ... ..	4.6
Industrial machinery ... ..	31.0

Three-quarters of the dollar allocations to Britain were grants—that is outright gifts. The remainder was a 2½ per cent loan on which interest payments are due to begin in 1952.

In Colonial development ECA has already approved assistance in geological and topographical surveys in Africa, South East Asia and British Guiana, and technical aid in studying control of the tsetse fly in East Africa and malaria research in West Africa.

Another aspect of the ECA's achievements is the guaranteeing the convertibility into dollars of earnings of five American companies which are investing 2.625 million dollars in plants in the U.K. The purpose is to finance recovery in Western Europe, and the guarantees which are for a period of 14 years cover returns to the investors only up to the amount of the original investment.

Among the most interesting of these investments are Godfrey L. Cabot, Inc., of Boston, for plant to be operated at Liverpool by Cabot Carbon, Ltd. (carbon black), \$850,000, and the Minneapolis-Honeywell Regulator Co., for investment in its subsidiary at Blantyre, Glasgow, Scotland (control instruments), \$300,000.

## Mechanised Packing

### Advanced Methods by Boots in Scotland

A MODERN factory, which has cost £500,000, was opened last week for Boots Pure Drug Co., Ltd., at Airdrie, Lanarkshire, by Mr. Thomas Johnson, former Secretary of State for Scotland.

The new building covers an area of eight acres and employs automatic machinery and labour saving plant brought from America. Interesting innovations have been made in the mechanical counting and bottling of tablets and stuffing the bottles with cotton wool. The last process, formerly done by hand, has long been an impediment to rapid packing.

Mr. Johnson, who was welcomed by Lord Trent, chairman of the company, stressed the importance of research work by chemists and said that he felt this new enterprise, which, when in full production, would employ 750 workers, would bring encouragement to what had been a distressed area.

## CHEMICAL EMPLOYMENT

LITTLE change was noticeable in the number of persons employed in the chemical and allied industries in Great Britain in the first month of this year according to figures published in the *Ministry of Labour Gazette* for March, 1949.

Sectional distribution of labour was as follows:—

Industry	(Thousands)		
	Jan. 1949	Dec. 1948	Mid- 1948
Coke ovens and by-products ... ..	17.5	17.4	17.3
Chemicals and dyes ... ..	196.4	196.4	195.5
Pharmaceutical preparations, etc. ... ..	32.1	32.0	30.8
Explosives and fireworks ... ..	35.5	35.1	33.8
Paints, varnish, etc. ... ..	37.1	37.2	37.0
Oil, glue, soap, ink etc. ... ..	111.0	110.2	106.5
Total, chemicals etc. ... ..	429.6	428.3	420.9

## De La Rue Centralisation

Thomas De La Rue & Co., Ltd., announces that as a result of its recent re-centralisation policy, the business of their two wholly-owned plastics subsidiaries, De La Rue Insulation, Ltd., and Hill, Norman & Beard Plastics, Ltd., has been transferred to the parent company and both businesses will, as from April 1 be operating as the plastics division of Thomas De La Rue & Co., Ltd.

Apart from this change of status the continuity of the businesses will be unaffected, and there will be no changes of personnel. The two remaining plastics companies in this group, De La Rue Extrusions, Ltd., and De La Rue Floors and Furnishings, Ltd., will continue as previously.



## More Dyestuffs

### Preserving Expert Control of Production

BRITISH dyestuffs users' views on desirable developments in making available full supplies of British and foreign dyestuffs were reflected in a speech by the chairman, Mr. James Ewing, at the recent annual meeting of the Bradford Dyers' Association, in Bradford. He recalled the world scarcity of dyestuffs and looked forward to an increase, two or three years hence, in United Kingdom production, aided by the increased allocation to the industry of steel by the Government.

"The British textile industry," he said, "still finds it necessary to import a small proportion of its dyestuff requirements, mainly from Switzerland, representing types not at present manufactured in Great Britain. Although this proportion is small, it is, nevertheless, of great importance that our industry should have unimpeded access to foreign supplies of dyestuffs in order to take full advantage of any new types that may be produced abroad.

"I have no doubt, judging from past experience, that with their new facilities for expanding production, the British makers will devote increasing attention to the development of new types of dyestuffs."

After recalling how unsatisfactory had been the experiment in State participation in the dyestuffs industry, during the 1914-18 war and immediately after, Mr. Ewing declared: "As chairman of an important company, largely dependent upon supplies of dyestuffs and allied chemical products as its main raw materials, and also, as a citizen who realises the importance to his country of a virile chemical and dyestuffs industry, I cannot but feel that it would be deplorable if there were to be a reversal of the two major principles of policy which have shown such good results—namely, management of the chemical and dyestuffs industry by men who have been brought up in the industry, and freedom from Government financial interest or control."

## New Propeller Fan

The wide range of the General Electric Company's propeller fans has been increased by the new 9 in. model, which combines improved appearance with exceptional efficiency. It employs a die-cast aluminium mounting, which serves as a blade guard and provides a neat curved grille for the fan aperture. It is suitable for a.c. single-phase, a.c. three-phase or d.c. operation and can be used with speed regulators and backdraught shutters up to the speed of 1350 r.p.m.

## Air Pollution

### Precise Photographic Measurement

PRECISE scientific measurement of visibility has been greatly facilitated by a newly developed photographic technique intended to aid the study of air pollution, according to Dr. Carsten Steffens, of the Stanford Research Institute, Stanford, California, lecturing at the recent 115th national meeting of the American Chemical Society. By photographing "smog"-obscured scenes, he said, it has been found possible to obtain a quantitative determination of the murkiness created by contamination.

"The pictures themselves show whether or not the atmospheric conditions are such that visual range is significant, and they are a permanent, impersonal record that can be interpreted at a later time by anyone who is concerned," Dr. Steffens said, adding that another important function of the new method will be to identify the material or materials responsible for pollution.

Whereas previous means of determining visibility were subjective and liable to errors in human judgment, in the new method a black object far enough away to be partially obscured is photographed. The photographic densities of the images of the object and of the adjacent sky are measured on the negative, and the visual range is calculated from these densities, the distance to the object, and the contrast of the film. The error of the method is claimed to be less than 10 per cent with readily and commonly available equipment, and can be reduced to 2 per cent.

## DSIR Appointments

THE appointment of a number of experts to serve as honorary members for four years of Department of Scientific and Research boards is announced. They will serve on the research board as individuals, not as representatives of any organisation to which they may belong. The appointments include the following:—

Chemistry: Prof. M. G. Evans (professor of physical chemistry, Manchester University). Mr. H. W. T. Thompson (lecturer in chemistry, Oxford University). Mr. F. Roffey (The Distillers Company, Ltd.).

Fuel: Dr. R. Holroyd (research manager, Billingham Division, I.C.I., Ltd.); appointment 3 years. Sir Charles Ellis (scientific member of the National Coal Board). Sir Cyril Hinshelwood (professor of chemistry, Oxford University).

Pest Infestation: Mr. C. B. Williams (chief entomologist, Rothamsted Experimental Station).



# The New Plasticisers

## Requirements for Use with Modern Thermoplastics

*From a Special Correspondent*

**P**LASTICISERS are high boiling liquids or solids which are added to plastic compounds to develop such properties as toughness and flexibility. In effect, the plasticiser acts as a lubricant between the polymer molecules, and so enables flow processes, such as extrusion, calendering and moulding, to be carried out easily.

The amount of plasticiser present in a thermoplastic may exceed the proportion of actual polymer present if it is required to produce a material that resembles rubber in elasticity and pliability. For example, as the concentration of dioctyl phthalate in vinyl chloride-acetate resins is raised from 10 to 40 per cent, the plasticised compound changes from a tough, stiff product to one that is distinctly rubbery to handle.

### Limited Choice

So important are plasticisers to the plastics industry that it is almost an understatement to say that the future prosperity of the industry depends to a large degree on the availability of new and improved plasticisers. There are hundreds of potential plasticisers, most of them high boiling esters, but only a relatively small proportion of these are actually in use.

The main requirements of a plasticiser for use with modern thermoplastics may be summarised as follows:—

1. Low volatility at normal and elevated temperature so that there is no appreciable loss of plasticiser during compounding, extrusion, calendering, moulding, etc., and no evaporation when the plastics article is exposed to tropical conditions. A boiling point of 400° C. is recommended as the ideal for all plasticisers, but several of the most useful of the better known plasticisers have a boiling point below this figure; for example, dimethyl phthalate has a boiling point of 282, and dibutyl phthalate 339° C. (760 mm Hg). Both these plasticisers are very extensively used in cellulose acetate and cellulose nitrate plastics.

2. Complete compatibility or miscibility is essential otherwise there will be a variation of plasticiser action throughout any given mass of polymer. The mechanism of plasticisation is essentially one of spacing or interposing the molecules of the plasticiser between the strong polymer bonds so as to reduce the intermolecular force. This cannot be achieved satisfactorily unless the plasticiser is fully absorbed by the polymer.

3. Chemical stability of the plasticiser

throughout a wide temperature range must necessarily be of a high order if the plastic article is to retain its optimum physical properties for a long period. For this reason preference is generally given to the higher molecular weight esters and particularly those that are non-reactive and possess low water solubility. It is known that the presence of certain reactive groups in the plasticiser molecule, e.g., amino groups, is liable to cause trouble, and in the search for new plasticisers the chemical structure needs to be carefully examined for potential sources of weakness. The effect of outdoor exposure of the plastic article to sunlight and the elements should not encourage chemical breakdown.

Apart from these main requirements, plasticisers need to possess fire resistance, non-toxicity, water extraction resistance, freedom from unpleasant odour, light colour, oil resistance and electrical insulating properties.

Plasticisers are available for endowing polymeric compositions with special properties; for example, triphenyl phosphate reduces the flammability of slow-burning cellulose acetate, and new alkyl aryl phosphates endow vinyl polymers with a high degree of flame resistance. It is also worth noting that the electrical insulating properties of a plastic can be greatly improved by adding certain plasticisers. In the polyvinyl chloride products the presence of dimethyl thianthrene increases the electrical resistivity, and ethylhexyl phthalate is also good, especially after ageing of the plasticised compound.

### Conflicting Needs

There are no ideal plasticisers and even the best have certain weaknesses. The plastic technologist has to show great skill in choosing a plasticiser for a particular plastic as the requirements of the different polymers vary considerably. Plasticisers which are of great value for thermosetting compounds are usually quite useless for thermoplastic resins; for example, for urea and melamine formaldehyde resins the addition of mixtures of ortho- and para-toluenesulphonamides or ethyl toluenesulphonamides in small percentages improves flow characteristics but they do not have the same effect when added to polyvinyl chloride.

Several new adipates are assuming importance and of these di-iso-octyl adipate,



dibutyl "cellosolve" adipate and dioctyl adipate, are the latest additions to the series. Di-iso-octyl adipate is a primary plasticiser for most resins and imparts permanent flexibility, low water extraction, extremely low temperature flexibility, good electrical properties, good heat stability, excellent stability to ultra-violet light, and easy processing.

It is a very efficient plasticiser and produces plastic film with low plasticiser-to-resin content, with good clarity and good handle, drape and resilience. Di-iso-octyl adipate is particularly suitable for use with nitrocellulose and produces clear, elastic films with low plasticiser content. With ethyl cellulose it gives good quality clear, elastic films.

### Characteristics

Films of polystyrene plasticised with di-iso-octyl adipate are pliable, non-tacky and practically free from blocking. It also produces good temperature-flexible stocks with synthetic rubbers. Di-iso-octyl adipate has a freezing point of  $-65^{\circ}\text{C}.$ , a flash point of  $367^{\circ}\text{F}.$  ( $186^{\circ}\text{C}.$ ) and a fire point of  $457^{\circ}\text{F}.$  ( $236^{\circ}\text{C}.$ ) at  $25^{\circ}\text{C}.$ , this plasticiser has no solubility in water, but it is completely soluble in petroleum and mineral oil.

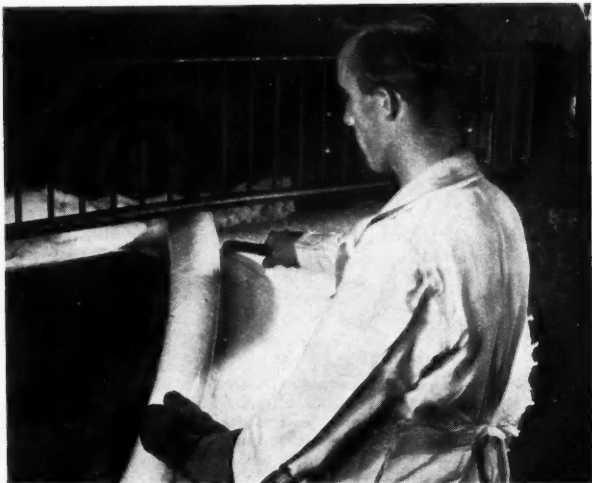
Dibutyl "cellosolve" adipate (dibutoxyethyl adipate) has a freezing point of  $-30^{\circ}\text{C}.$ , a flash point of  $370^{\circ}\text{F}.$  ( $188^{\circ}\text{C}.$ ), a fire point of  $440^{\circ}\text{F}.$  ( $277^{\circ}\text{C}.$ ). It has found wide use in the production of

safety glass because it imparts excellent ultra-violet light stability and extremely low temperature flexibility to the plastic sandwich layer between the two glass plates. There are also valuable properties of this compound when used in the combining of paper or textiles. Dioctyl adipate has a freezing point of  $-70^{\circ}\text{C}.$  (clear gel) and a pour point  $-69^{\circ}\text{C}.$ , a flash point of  $377^{\circ}\text{F}.$  ( $192^{\circ}\text{C}.$ ) and a fire point of  $445^{\circ}\text{F}.$  ( $299^{\circ}\text{C}.$ ) and mid-boiling-point at 4 min. of  $213^{\circ}\text{C}.$  It is a very efficient plasticiser and produces good elastomers with low plasticiser-to-resin content. By comparison it has higher solvent power and it is more efficient than dioctyl phthalate in the ratio of 29 per cent to 33 per cent.

Where flexibility and drape are called for in the plasticising of vinyl-calendered sheet and film, a preference is now being shown for the fatty acid esters, and di-octyl sebacate is a typical example of one of these. It is generally used with standard plasticisers, such as DOP (dioctyl phthalate), which have the effect of reducing migration of the sebacate without affecting its characteristic plasticising action.

The fatty phthalic acid esters are excellent non-migrating plasticisers for most resins. They impart permanent flexibility, low water extraction, low temperature flexibility, good electrical properties, heat stability, excellent hand and drape, high resilience and gloss. In

PVC polymer must be fully plasticised to ensure easy calendaring, extrusion and moulding. Here the PVC composition is being compounded in hot rolls to provide complete mixing, distribution and blending of the polymer



(Courtesy of I.C.I., Ltd., Plastics Division)



extruding or calendering compounds the fatty phthalic acid esters impart clarity, heat stability, permanence and gloss. They do not present the problem of cold streaking on the calender which is common with such plasticisers as dioctyl phthalate.

New in this field of fatty acid esters are tetrahydro-furfuryl oleate, which possesses superior internal lubricating properties, and diethylene glycol dipelargonate for low temperature performance.

### Azelaic Acid

The dibasic acid, azelaic acid ( $C_9H_{16}(COOH)_2$ ) is now being used as a raw material for the production of plasticisers. It is also recommended for the manufacture of non-drying type alkyds, where it replaces a portion of phthalic anhydride and results in greater flexibility, improved toughness, good adhesion and good colour. The esters of azelaic acid are likely to be used to an increasing extent where high efficiency, excellent low temperature performance, negligible volatility and good oil resistance are needed for vinyl plastics.

The 2-ethyl hexyl ester of azelaic acid imparts low temperature flexibility to films which are clear, free from haze and possess excellent tear strength. Another interesting azelaic plasticiser is di-octyl azelate which is of value for plasticising polyvinyl chloride and polyvinyl acetate-chloride cast films and calendered sheet.

A footnote on the use of fatty acid esters is that some of them are liable to encourage mould growth in the surface of plasticised plastics. In a recent publication, "Microbiological Deterioration of Organic Materials; Its Prevention and Methods of Test," by E. Abrams, issued by the U.S. Bureau of Mines, it is mentioned that although it was found impossible in all cases to correlate the chemical structure of the plasticiser to its susceptibility to mould growth, certain leading facts were established.

As a class, the phthalate plasticisers offered no source of nutrition to *A. niger*, but vicinolantes, sebacates and stearates invariably supported copious growths of this organism. Unplasticised pure polymers in most cases encouraged a slight mould growth, but not to the extent to cause any concern.

### Compatibility

The citric acid esters, notably triethyl citrate, tributyl citrate, acetyl triethyl citrate, acetyl trihexyl citrate and acetyl tributyl citrate, are compatible with most of the thermoplastics; for example, acetyl triethyl citrate is fully compatible with cellulose esters and mixed esters, ethyl cellulose, polystyrene, vinyl acetate, vinyl

chloride, vinyl chloride acetate and vinyl butyral. The acetyl trihexyl citrate plasticiser compares favourably with dioctyl for plasticising vinyl film intended for food packaging on account of its non-migratory properties, resistance to oil and complete non-toxicity.

Alkyl carbonates of lactates produced by acylating lactic esters with alkyl chloroformates are newcomers to the range of lactic acid plasticisers. All these esters are compatible with ethyl cellulose and polyvinyl chloride, and, judged by modulus and brittle point, these new lactates are more efficient than 2-ethylhexyl phthalate.

The esters of acetic acid are newcomers to the plasticiser field and are particularly valuable for the vinyl polymers where chemical stability of the highest order is specified. In the U.S.A polymeric plasticisers based on acetic acid are in use. These possess extremely low volatility and very low extractability by water and oil.

Ranking high in phosphate plasticisers is Monsanto's newest plasticiser, Santicizer 141. This is an alkyl aryl phosphate which possesses low toxicity, high compatibility with vinyl resins, low volatility, softness and drape, resistance to weathering, strength, elasticity, abrasion resistance, good low temperature flexibility. By incorporating this phosphate plasticiser in polyvinyl chloride compounds it is possible to achieve exceptional flame retarding qualities without sacrificing flexibility or drape.

### Burning Rate

This superiority is proved by a comparison of burning rates—Santicizer 141 flames out in 1 second flat, while other equally efficient plasticisers have a minimum burning rate of 38 seconds. In addition to this vital safety factor, the alkyl aryl phosphate has many other advantages for vinyl compositions used in curtains, upholstery, tablecloths, floor tiling, wearing apparel and a wide variety of similar products.

Another new phosphate plasticiser is cresyl diphenyl phosphate, which in some ways is similar to the well known TCP or tricresyl phosphate. Advantages claimed by the newcomer include improved low temperature flexibility and superior light stability.

The recently developed phthalates include dicyclohexyl phthalate. This is a white granular plasticiser which is used in supported and unsupported vinyl films. It imparts increased toughness and tear resistance and materially assists processing.

Dicyclohexyl phthalate is compatible with polyvinyl chloride, polyvinyl acetate, and co-polymers, polystyrene, polyvinyl butyral,



ethyl cellulose, cellulose nitrate, chlorinated rubber and butadiene-acrylonitrile copolymers. This new plasticiser is of particular value in the compounding and processing of supported and unsupported vinyl films and extruded products. It aids in providing a soft handle to the material, high gloss and clarity to finished materials. Its excellent compatibility and good melting action during processing help to eliminate calendering and extruding difficulties. The properties of this plasticiser, which is known as Barrett's 50-B, are as follows:—

Colour: Clear, practically water-white  
(Hazen 50 max.)

Form: Liquid.

Odour: Mild Ester.

Distillation at 5 mm. Hg. 189-222° C.

Specific gravity 25-25° C.: 1.076

Refractive index at 20° C.: 1.507

Viscosity centipoises

at 5° C. 46.7

at 25° C. 87.0

at 50° C. 22.8

The glycol esters are good all round plasticisers, and of these triglycol dihexoate, triglycol dioctate and polyethylene glycol di-2-ethylhexoate are of the greatest and most immediate interest. The last named promises to find many applications because of its unique properties. It shows the same order of non-volatility from compositions of vinyl chloride-acetate compositions as does dioctyl phthalate and, in addition, it is very efficient, since only 30.5 per cent is required to produce standard elongation.

To those working with surface coatings, moulded, extruded, and calendered plastic compositions and synthetic rubber, the polyethylene glycol di-2-ethylhexoate is definitely of considerable value.

### Stable Preparations

Where non-migration of plasticiser is essential there are now available resinous compounds which possess low volatility and resistance to extraction by water and oil. For example, a linear polyester of sebacic acid and glycol has been developed for use with vinyl polymers and co-polymers, also butadiene acrylonitrile rubbers, etc. This plasticiser is non-volatile and exhibits resistance to extraction by water and petroleum oils. It is a flame-resistant to a higher degree than most esters and it is resistant to discoloration and light. Other polymeric esters synthesised from polyfunctional acids and polyfunctional alcohols are also in use as plasticisers for vinyl polymers.

The compositions of many of these polymeric plasticisers are seldom given by the manufacturers, probably because most of them are complex blends of several

resinous compounds. They are of chief value for plasticising vinyl polymers and phenolic and urea resins. For the thermosetting materials the addition of the plasticiser lowers the viscosity at moulding temperatures, without materially affecting the speed of cure, thus permitting better flow and more uniform moulded articles.

This improved flow is especially valuable where a low concentration of resin is to be incorporated with a bulky filler. For example, brake band manufacturers find that it improves frictional and wearing qualities by uniform distribution of the binder resin in the asbestos fillers of the friction material.

Nitrile rubber, a co-polymer of butadiene and acrylonitrile, is another non-migratory plasticiser of special value for vinyl films to be used for food packaging. Its high molecular weight enables it to resist extractions by edible fats and greases.

### Nitrile Rubber

A new American pouch-package for oleo-margarine has been developed which is made from a combination of nitrile rubber and vinyl resin. This package calls for high transparency, flexibility, considerable strength, and, moreover, it is tasteless and odourless. Nitrile rubber possesses poor ageing properties and it is necessary to add an anti-oxidant to the plasticiser to prevent deterioration.

New modified thermosetting compounds are also made by blending nitrile rubber with phenolic materials. The improved mouldings have five times the endurance of general purpose wood-flour-filled phenolics and they are unaffected by sudden temperature changes. The nitrile rubber phenolic moulding powder can be safely moulded in thin sections, and it is ideal for parts with large inserts which are subject to vibration and flexing.

When using polymeric plasticisers and also nitrile rubber it is usual to make use of other plasticisers which are compatible with these substances and also with the polymers. Dioctyl phthalate is probably the most useful plasticiser for blending purposes as it possesses low volatility, good chemical stability and compatibility. Moreover, its presence tends to mask the somewhat inferior ageing properties of the nitrile rubbers.

### Possible Toxicity

The phthalates as a class are safe plasticisers, being non-toxic and efficient whereas the phosphates, although possessing the additional property of flame-resistance, are liable to be suspected on account of toxicity, even the ortho-free types being still open to suspicion.



# TRI-ACETYL AND ALLYL ETHERS OF STARCH

## Essentials of Recent Italian Processes

MUCH interest has been evoked during the past few years by the possibilities of some of the acetyl and allyl ethers of starch in the thermoplastic and other fields. G. Jacini and M. Ferrazzi have surveyed recent work, especially on tri-acetyl starch and some of the allyl ethers, and contributed also results of their own. (*La Chim. e l'Ind.*, 1949, 31, 1-2.)

Among the later methods for acetylating starch are those described in Italian Patent No. 389,424 of N.V.W.A. Scholten's Chem. Fabr., U.S. patents Nos. 2,362,282, 2,399,455, 2,412,213, and 2,376,378; also one described by R. S. Higginbottom (*J.S.C.I.*, 1938, 57, 234). Acetyl chloride is used in the first, and in the others mainly acetic acid or anhydride at temperatures up to 140°C.

The present authors have endeavoured to find a process that could be used at room temperature or a little above, without any reduction in yields and with reduced risk of decomposition of starch or other defects. It was hoped in this way to obtain films of allyl starch of a particularly strong and resistant kind. Various kinds of starch were used as starting material, including maize and rice starches.

### Early Results

Several preliminary tests were made with acetyl chloride and the anhydride, with or without glacial acetic acid, including that described in U.S. patent No. 2,367,378 (temperature up to 140°), but with not very satisfactory results. Dextrin formation was much in evidence.

Gelling methods, using formic acid and acetic anhydride, as already proposed by A. Kldiaschwili and the Calico Printers' Association (English patent No. 535,949) were also tried, with wide variations in ratio of acetic and formic acids, amounts of acetic anhydride, nature of acid catalysts (sulphuric, phosphoric, or perchloric acids), and reaction time. The following procedure was eventually adopted with some success:—

(a) In the treatment with formic-acetic mixture (60 per cent of formic acid (95.6 per cent) and 40 per cent acetic anhydride), one part of starch dried to 0.3 per cent humidity was covered with 1.3 parts of mixture. Swelling of the starch granules at once began and reached maximum in about an hour; some stirring is desirable. The swelling could be easily followed with the

microscope. The grain cuticles gradually break and the contents pass into solution, forming ultimately a very viscous, semi-transparent, homogeneous mass. This lasted for about 20 hours.

(b) In the acetylation process, the starch so prepared was placed in a suitable vessel with mechanical stirrer, and acetic anhydride was added by drops, with about 1 per cent sulphuric acid. (The amount of anhydride added is not stated.) The temperature, increased with the evolution of the gas (CO), should be kept down to 35°C. or thereabouts, by cooling if necessary; also, a little glacial acetic acid may be added to moderate exothermic action due to CO formation.

### An Eight-Hour Process

This exothermic reaction lasts until about half the anhydride used has been added, i.e., for an hour; successive additions are made, with stirring, in two 3-hour periods, and after 8 hours the process is completed.

The yellowish viscous solution obtained was plunged into a larger vessel full of water whereby the acetyl derivative is precipitated in compact curd-like form. This was washed thoroughly by frequent decantation with water and finally with 5 per cent sodium bicarbonate.

Using a sample of this product, dried at a temperature below 70°, determinations were made of the acetyl groups percentages, by the method described in Gatterman, 24th edition, p. 88.

62.3 per cent was found calculated as  $\text{CH}_3\text{COOH}$ , and free from acetyl-dextrin. Saponified with NaOH (2N), filtered, and acidified slightly with acetic acid, it gave, with N/10 iodine solution, the blue colour of starch without any admixture of violet. The yields of tri-acetate, dry, were about 98 per cent.

### Gatterman Method

It was sometimes found that the yields of the acetyl groups, found by the Gatterman method, were above the maximum theoretical (62.5 per cent), namely 67.3 per cent. From a series of blank tests, warning with sulphuric acid, etc., it was found that the excess of 4.8 per cent could be accounted for as levulinic acid, or some other acid constituent.

Similar results could be obtained with rice or maize starch, the only difference

(Continued at foot of next page)



## Liquid-Level Recording

### Audible Remote Control System

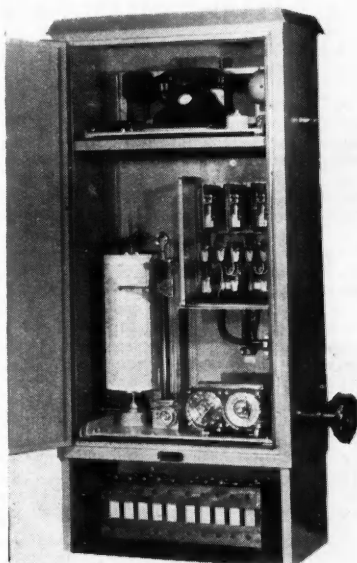
PERMITTING the long-range recording of liquid levels is the achievement of an installation produced by Gent & Co., Leicester, known as an audible liquid-level indicating and recording equipment.

The system can be employed anywhere a G.P.O. telephone is available. There are two forms of equipment, float operated and electrode operated.

The former consists of a transmitter, operated through a sprocket by a float, chain and counterweight arranged to suit the particular installation; a relay equipment which receives the level indications from the transmitter; a G.P.O. telephone instrument; a level recorder and current supply—usually from a 12 volts d.c. accumulator.

When a call is made to the instrument in the cabinet at the liquid storage point, a short ring indicates the caller is connected. Audible signals are given by distinctive gong and buzzer notes, indicating feet and inches, and are repeated three times to avoid possible error, while synchronised with the sound, the level is traced on the recorder.

The electrode type is purely an audible level indication equipment, having no recording facilities. It is less expensive, and intended for use where level indications are not required to the accuracy of one inch. The relay equipment operates according to the number of electrodes submerged.



The "nerve centre" of the float-operated equipment for audible remote recording of liquid levels. Below the G.P.O. telephone is the barrel type recorder (left) on which is registered the evidence of the audible indicator

### TRI-ACETYL AND ALLYL ETHERS OF STARCH

(Continued from previous page)

being in the period required for pre-treatment with the formic-acetic mixture. The tri-acetyl starch readily dissolved cold in acetone, yielding 30-35 per cent solutions of acetyl starch, quite compatible with butyl phosphate or phthalate, and miscible in all proportions in acetyl cellulose solutions.

A considerable amount of work on the allyl ethers of starch has been done by Nichols and Yonovsky (*Ind. Eng. Chem.*, 1945, 37, 201; 1946, 38, 864). The present authors found some difficulty in allylating either starch of its tri-acetyl derivative with allyl chloride, but eventually evolved the following method:—

(a) 10 g. of dry tri-acetyl starch, prepared as above, in an autoclave of 200 c.c. capacity (stainless steel), were mixed with 25 c.c. acetone, 25 g. 50 per cent NaOH, and 25 c.c. allyl chloride, with continual stirring for 16 hours at 90°. Excess allyl

chloride was distilled off, and the allyl starch remained as a brownish gelatinous mass. This was decanted with alkaline solution, washed several times with water until the reaction was neutral, and dried over  $P_2O_5$  at room temperature, after which it was Soxhlet-extracted with acetone.

The concentrated acetone solution was placed in about eight times its volume of water containing 10 per cent by volume of saturated NaCl solution. The allyl-starch at once coagulated, and was precipitated in a filtrable form. Repeating this treatment at least twice, a sufficiently pure product was obtained practically free from mineral matter.

Iodine values determined by the Nichols and Yonovsky method gave 155-200 according to the purity of the sample; for very clear samples it was 174; for  $C_6H_7O_5 - C_3H_5$  it was 125; and for  $C_6H_7O_5 - (C_3H_5)_2$  it was 209. The value 174 thus corresponded to an allyl-starch with 1.58 groups (allyl) per 6 carbon atoms, or a percentage content of 29 per cent allyl constituent.



## "Hypersorption" Separation of Gases

### Cheap Recovery from Raw Petroleum Claimed

**S**OME of the benefits of what is called the "hypersorption" process for the separation of petroleum gases have been described before the Division of Physical and Inorganic Chemistry of the American Chemical Society by Mr. Clyde Berg, of the Union Oil Company of California, Wilmington. The new method is stated to permit hydrogen, ethylene, propane and other gases essential to the manufacture of many foods, drugs, plastics and other products to be recovered cheaply from raw petroleum.

Although methods existed for recovery of these products from petroleum gases—derivatives such as helium, carbon black, alcohols, pharmaceuticals and plastics—in many cases these methods were costly, and the benefits of chemicals available from these sources had been restricted, he said. In the hypersorption process, the gases were separated by their adhesion to a solid activated charcoal. The heavier compounds of natural gas were soaked up by this material

to a much greater extent than the lighter components.

The hypersorption unit was described as a tall, round column with a cooler at the top and a steam section at the bottom. In between, the activated carbon, which was granulated, separated the gases into parts and then passed down into the steam section for removal of the gases clinging to it.

The importance of the hypersorption method was accentuated by the hydrogenation processes which it facilitated, such as the conversion of vegetable oils into margarine, the turning of ammonia into fertilisers, and the making of compounds used in plastics. The many uses of ethylene were likewise made more possible. Hypersorption enabled the recovery of propane to be affected more economically from natural gas. Propane could be cracked to produce ethylene, acetylene, propylene and other hydrocarbons which then were recovered and purified by the hypersorption process.

## Low Temperature Tar: German Practice Surveyed

**A**N important American contribution to the Allied literature on German chemical and allied processes studies German production of coal tar by low-temperature methods, which contributed to the sources of that country's hard pressed reserves of liquid fuels. Petrol and oil were extracted from the tar by distillation or hydrogenation.

The bases of this industry are the subject of the newly issued German "Low-Temperature Coal Tar Industry" (Information Circular No. 7490), which is being distributed without charge by the U.S. Bureau of Mines.

Part I of the three-part publication points out that major production of low-temperature tars did not begin in Germany until 1918 when the shortage of mineral oils became acute. The increasing demands for liquid fuels between 1933 and 1945 hastened the development of a low-temperature coal tar industry which, by 1943, was producing 658.25 million gall., exceeding the production of the long-established high-temperature coal-carbonisation industry by roughly 154.6 million gall.

The first section of the publication deals with hydrogenation, distillation and cracking, yields of products by different operating procedures and the refining and use

of tar acids, and lists the number of plants in operation and under construction at the end of the war, describing the latest German processes.

Part 2 includes brief, technical reports of interviews with officials of leading low-temperature tar companies, as well as first-hand reports on visits to typical German plants at Wanne-Eickel and Helmstedt.

The concluding section includes an exhaustive index of German scientific literature on low-temperature carbonisation of bituminous coals. Flow diagrams employed at major plants and numerous engineering drawings of equipment discussed in the text are also included.

**Coal Tar Products.**—In a review of the coal tar industry to members of the Scottish branch of the Institute of Petroleum in Edinburgh last week, Col. F. M. Potter emphasised that the value of primary products of tar distillation exported was about £6.5 million, of which nearly half was to hard currency countries. It should be remembered that the export of some products was controlled until the basic raw materials needs of other exporting industries, such as plastics, had been met.



# LABORATORY USE OF LIQUID HELIUM

## New Light on Conductivity and Liquid and Solid States

*From Our New York Correspondent*

*(An earlier article described the development and operation of the new helium liquefier which is proving very useful in a programme of basic research on the properties of matter of extremely low temperatures, now being carried out at the research laboratories of the U.S. National Bureau of Standards.)*

**W**HILE expected to be of material aid in several spheres of low-temperature research, the new helium liquefier (*THE CHEMICAL AGE*, 60, 418-419) is expected to find ready use in the study of superconductivity and an experimental determination of the properties of He 2.

The phenomenon of superconductivity, characterised by complete disappearance of the electrical resistance of certain materials at very low temperatures, was remarked by H. Kamerlingh Onnes in 1911. Soon after, it was observed that resistance reappears when a large electric current is passed through a superconductor or when a sufficiently strong magnetic field is applied.

In 1918, F. B. Silsbee, of the National Bureau of Standards, postulated that resistance is restored when the magnetic field reaches a critical value, regardless of whether the field is applied externally or is caused by the current in the conductor. This theory, known as the Silsbee Hypothesis, has been verified for pure metals in numerous experiments; alloys, however, are an interesting exception.

Dr. Silsbee also gave an analysis, based on electromagnetic theory, which described

the resistance in a straight cylindrical superconducting wire as a function of the current as the current is increased up to, and beyond, the critical value. It was predicted that there would be no resistance until the current reached the critical value. The resistance would then rise suddenly to one half the "normal value" (its value just above the superconducting transition temperature); and, upon further increase of current, the resistance would rise gradually to approach the normal resistance.

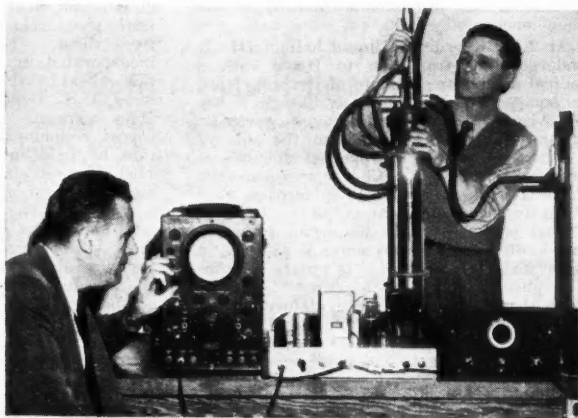
As part of the comprehensive research programme on superconductivity, an experimental investigation was recently made of the restoration of the resistance of superconducting wires with increase in current. Straight lengths of pure indium wires of three different diameters were immersed in a bath of liquid helium and cooled until they became superconducting. Resistance was obtained as a function of current for each specimen at several different temperatures.

It was found that there was a sudden rise of resistance when the current reached a critical value, followed by a slower rise of resistance as the current was further

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**Apparatus now being used for the study of the velocity and attenuation of "second sound." The oscilloscope, at left, puts in action the multi-vibrator (centre) and at the same instant begins its horizontal time sweep**

⊗





increased. Moreover, the amount of resistance that appeared suddenly was independent of the temperature of the specimen, even though the current required to restore this resistance was temperature-dependent. To this extent the results described are in agreement with the theory.

However, the magnitude of the sudden rise of resistance was 77 to 85 per cent of the normal resistance, instead of one-half as predicted. Also, the larger the diameter of the wire, the smaller was the fraction of the normal resistance that reappeared when the current reached the critical value, although the theory shows no dependence on specimen diameter.

This disagreement with theory adds interest to the experimental results. Recent theoretical investigations on the nature of the intermediate state of superconductors have pointed out in a qualitative way some of the shortcomings of the earlier theory, but as yet no quantitative theoretical treatment has explained the results obtained experimentally.

### Superconductors

Another phase of superconductivity research at the bureau concerns the behaviour of superconductors at microwave frequencies. In experiments using low-frequency or direct currents, superconductors show a complete loss of resistance below the transition temperature, whereas at optical and infra-red frequencies the superconducting state does not occur. The microwave region remains as a kind of twilight zone; here the metals exhibit an intermediate type of behaviour losing only a portion of their resistance at low temperatures. Results of the present investigation may well contribute to a clearer conception of the fundamental nature of the phenomenon.

At 2.19° K, ordinary liquid helium (He 1) undergoes a transition to He 2 with a radical alteration of many of its properties. In some ways He 2 acts as though it has no viscosity, flowing through virtually vacuum-tight openings and up the side of a containing vessel in apparent defiance of gravity. At the transition temperature the thermal conductivity of He 1 increases very abruptly to an apparent value for He 2 as a kind of wave motion analogous to sound and known as "second sound," whereas in other materials heat flow is purely a diffusion phenomenon.

All these effects may be explained by the presence in He 2 of a superfluid. The atoms of the superfluid suffer a reduction of energy by cooling to the point where thermal motion has almost ceased, yet the intermolecular forces are not great enough to produce a rigid solid. As a result, viscosity

practically disappears, and other remarkable properties are observed.

Second sound has recently been obtained at the bureau through use of liquid helium produced in the new Simon-type liquefier, and a project has been undertaken for the study of various aspects of second-sound propagation in He 2. Unlike ordinary sound, second sound is generated thermally and is detected by temperature-sensitive devices.

The present investigation employs a recently developed pulse method so that signals that would otherwise be quite difficult to detect are presented on an oscilloscope screen for visual observation. Pulses of heat generated electrically within liquid He 2 travel through the helium and are detected upon arrival at a temperature-sensitive element; meanwhile, their transit time is measured accurately by electronic timing circuits.

Several quantities, including the velocity and attenuation of second sound, result directly from these data, and various types of coupling with ordinary sound are also being studied.

Investigation of the properties of liquid He 2 provides one of the most promising approaches towards a better understanding of the properties of matter. The work now in progress at the bureau is expected eventually to lead to a clearer picture of the liquid and solid states.

### IRON PARTICLE SIZE

**A**IDED by a \$22,500 U.S. Government grant, the Stevens Institute of Technology has just concluded an intensive research project on the effect of particle size on the physical properties of commercial iron powders and on compacts prepared from them. Findings of the study are incorporated in a 300-page report released this week by the Office of Technical Services, U.S. Department of Commerce.

As a result of these observations, the report recommends that considerable attention be paid to the very coarse fractions (100-150 mesh sizes) as these appear to have marked effects upon the tensile strength of a powder. The study indicates that in addition to the removal of coarse fractions from a powder, increases in compacting pressure also have a beneficial effect upon the tensile strength of pressed and sintered compacts.

Specific recommendations are included in the study for the improvement of commercial specifications applicable to iron powders. It is emphasised, however, that particle size is but one of the characteristics determining properties of metal powders.



## Thickness Measurement by Beta Emission

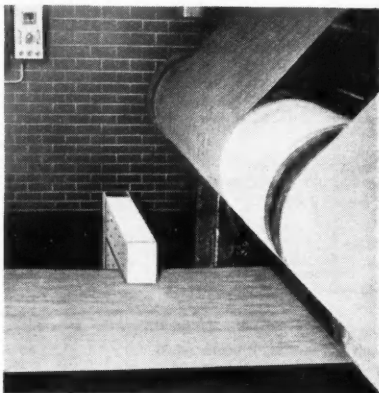
### Commercial Use of a New Technique

**T**HE principle of the continuous measurement of the thickness of sheet materials is demonstrated by a new instrument called the Meta-Ray thickness gauge recently announced by the (U.S.) General Electric Company's special products division. By measuring absorption, the device is stated to indicate the mass per unit area of the material under test, but can be calibrated in terms of thickness to help operators maintain product uniformity, reduce the amount of rejected material, and save on the amount of raw material used.

Developed by the company's general engineering and consulting laboratory, the new gauge is expected to find application in keeping check of the thickness of metal foils, such as aluminium, copper, tin, brass, and steel, being rolled at high speeds. In addition, G.E.C. engineers state it can be used with plastics, textiles, rubber, and other sheet materials, especially those that cannot be contacted because of their condition while in processing.

#### Absorption Measured

In operation, the Meta-Ray thickness gauge measures the deviation from a chosen setting by registering the amount of  $\beta$  rays which the material under test absorbs. The source of  $\beta$  rays in the gauge is 2.5 milligrams of strontium 90. Those rays, unabsorbed by the material passing through the gauging head, are gathered in an ionisation chamber. An attenuated 90-cycle signal is added in phase opposition to cancel the signal from the ionisation chamber. The attenuator voltage, therefore, is a measure of the ionisation chamber voltage, and of



Showing the monitoring instrument, containing a radioactive isotope of strontium, in factory use to gauge the thickness of resin impregnated paper as it passes through an American paper coating machine

the amount of material in the  $\beta$  ray beam.

Operating on a power supply of 100-125 volts, 60 cycles,  $\pm 0.3$  cycles, the power consumption of the gauge is about 150 watts. Its accuracy is said to be  $\pm 2$  per cent or better between normal periods of calibration, while drift is not more than 1 per cent per hour after a 30 minute warming-up period. Under normal conditions it is claimed, calibration need not be made more often than once every four hours.

## New High Record for Steel in March

**A**FRESH production level in steel was established last month with an annual rate of 16,269,000 tons. Following the record output for February, this made an annual rate of 15,850,000 tons for the first three months of the year, easily the highest quarterly figure ever recorded.

Even taking into account the national decline in production to be anticipated during the holiday season later in the year, the present rate is well up to the target level of 15,250,000 to 15,500,000 tons for the full year.

Pig iron production was less than in February, being partly affected by the re-lining of a number of furnaces, but never-

theless the total of 9,324,000 for the first quarter of 1949, shows a considerable increase over the same period of the previous year.

Comparative figures were:—

STEEL INGOTS AND CASTINGS (Thousands of tons)					
		1949		1948	
		Weekly average	Annual rate	Weekly average	Annual rate
January ...	...	289	15,002	281	14,589
February ...	...	311	16,176	280	15,049
March ...	...	313	16,269	291	15,117
First quarter	...	305	15,850	287	14,933
Pig Iron					
January ...	...	178	9,262	168	8,726
February ...	...	181	9,422	176	9,169
March ...	...	179	9,295	179	9,303
First quarter	...	179	9,324	175	9,084



# DEPRECIATION & MAINTENANCE—IX

## Determining the Cash Value of Machines

By S. HOWARD WITHEY, F.Comm.A.

THE decimal .122820 (shown in the table THE CHEMICAL AGE, 60, 456) multiplied by 1275 gives £157, to the nearest £1, and the investment account will be made up in the manner indicated below:—

year, and as the company's patents still have six years to run the sum of £630, or one-sixth of the existing book value, will be written off each year.

The machines acquired by the company

Debit		INVESTMENT		Credit	
1949		£ 1949		£	
Jan.	To 1st Annual Premium ... ..	157	Dec.	By Balance Carried Down ... ..	164
Dec.	To 5 per cent Interest ... ..	7			
		<u>£164</u>			<u>£164</u>
1950					
Jan.	To Balance Brought Down ... ..	164	1950		
	To 2nd Annual Premium ... ..	157	Dec.	By Balance Carried Down ... ..	337
Dec.	To 5 per cent Interest ... ..	16			
		<u>£337</u>			<u>£337</u>
1951					
Jan.	To Balance Brought Down ... ..	337	1951		
	To 3rd Annual Premium ... ..	157	Dec.	By Balance Carried Down ... ..	518
Dec.	To 5 per cent Interest ... ..	24			
		<u>£518</u>			<u>£518</u>
1952					
Jan.	To Balance Brought Down ... ..	518	1952		
	To 4th Annual Premium ... ..	157	Dec.	By Balance Carried Down ... ..	708
Dec.	To 5 per cent Interest ... ..	33			
		<u>£708</u>			<u>£708</u>
1953					
Jan.	To Balance Brought Down ... ..	708	1953		
	To 5th Annual Premium ... ..	157	Dec.	By Balance Carried Down ... ..	908
Dec.	To 5 per cent Interest ... ..	43			
		<u>£908</u>			<u>£908</u>
1954					
Jan.	To Balance Brought Down ... ..	908	1954		
	To 6th Annual Premium ... ..	157	Dec.	By Balance Carried Down ... ..	1,118
Dec.	To 5 per cent Interest ... ..	53			
		<u>£1,118</u>			<u>£1,118</u>
1955					
Jan.	To Balance Brought Down ... ..	1,118			
	To 7th Annual Premium ... ..	167			
		<u>£1,275</u>			

The items of annual interest will be transferred from the investment account to a sinking fund, and on the expiration of the lease the balance standing to the credit of the fund will be dealt with by transferring two-thirds of the amount to the credit side of the premises account, and one-third to profit and loss. Upon realising the investment, the amount of cash received will be posted direct from the debit side of the company's cash book to the credit side of the investment account, which will then balance, and the cash will be available for the renewal of the lease on the terms specified in the agreement.

In order to reduce the book value of the transport to £2500 at the end of five years, the sum of £500 will be written off each

on the hire-purchase system arrived in perfect working order and the first deposit had already been debited in the ledger. Owing to a difficulty in determining the present cash value of the machines it was decided to pay a further five annual instalments, but as the vendors had undertaken to accept one cash payment on January 1, 1949, it was finally agreed that interest should not commence until that date, and that being an item of capital expenditure the amount already debited to the machines account should stand.

In order to ascertain the interest charges it was necessary to know the cash value of the machines, and reference was made to the table (shown at the top of the following page).



Years	2½ per cent	3 per cent	3½ per cent	4 per cent	5 per cent
1	0.976	0.971	0.966	0.962	0.952
2	1.927	1.914	1.900	1.886	1.859
3	2.856	2.829	2.811	2.775	2.723
4	3.762	3.717	3.673	3.630	3.546
5	4.646	4.580	4.515	4.452	4.330
6	5.508	5.417	5.329	5.242	5.076
7	6.349	6.230	6.114	6.002	5.786
8	7.170	7.020	6.874	6.733	6.463
9	7.971	7.786	7.608	7.435	7.108
10	8.752	8.530	8.317	8.111	7.722
11	9.514	9.253	9.002	8.761	8.306
12	10.258	9.954	9.663	9.385	8.863
13	10.983	10.635	10.321	9.986	9.344
14	11.691	11.296	10.920	10.563	9.899
15	12.381	11.938	11.517	11.118	10.380
16	13.055	12.561	12.094	11.652	10.838
17	13.712	13.166	12.651	12.166	11.274
18	14.353	13.754	13.190	12.659	11.690
19	14.979	14.324	13.710	13.134	12.085
20	15.589	14.878	14.212	13.590	12.462
21	16.184	15.415	14.698	14.029	12.821
22	16.765	15.937	15.167	14.451	13.164
23	17.332	16.444	15.620	14.857	13.489
24	17.885	16.936	16.058	15.247	13.799
25	18.424	17.413	16.482	15.622	14.094

The above table gives the present value of £1 at varying rates of interest over periods up to 25 years, and multiplying the decimal 4.330 by 120 gave £520 (to the nearest £1), consequently this amount was credited to the vendor's account as at January 1, 1949. At December 31, 1948, the deposit of £120 was represented by

assets to the net value of £88, the remaining £32 having been absorbed as wear and tear during the previous three months. The book value of the machines will be subjected to annual deductions for depreciation, and at the end of the fifth year the machines account and the vendors' account will show the following entries:—

Debit	MACHINES (HIRE-PURCHASE)	Credit
	£	£
1948	1948	
Oct. 1 To Deposit ... ..	120	
Dec. 31 To Cash Value of Annuity of £120 for five years at 5 per cent ...	520	
	£640	
		£640
1949	1949	
Jan. 1 To Balance ... ..	608	
	£608	
		£608
1950	1950	
Jan. 1 To Balance ... ..	486	
	£486	
		£486
1951	1951	
Jan. 1 To Balance ... ..	389	
	£389	
		£389
1952	1952	
Jan. 1 To Balance ... ..	311	
	£311	
		£311
1953	1953	
Jan. 1 To Balance ... ..	249	
	£249	
		£249
1954	1954	
Jan. 1 To Balance ... ..	200	
	£200	
		£200



Debit		VENDORS' ACCOUNT		Credit	
1949		£ 1948			
Jan. 1	To 1st Instalment ... ..	120	Dec. 31 By Machines ... ..	520	
Dec. 31	To Balance ... ..	426	1949		
			Dec. 31 By 5 per cent Interest ... ..	26	
		£546		£546	
1950		1949			
Jan. 1	To 2nd Instalment ... ..	120	Dec. 31 By Balance ... ..	426	
Dec. 31	To Balance ... ..	326	1950		
			Dec. 31 By 5 per cent Interest ... ..	20	
		£446		£446	
1951		1950			
Jan. 1	To 3rd Instalment ... ..	120	Dec. 31 By Balance ... ..	326	
Dec. 31	To Balance ... ..	222	1951		
			Dec. 31 By 5 per cent Interest ... ..	16	
		£342		£342	
1952		1951			
Jan. 1	To 4th Instalment ... ..	120	Dec. 31 By Balance ... ..	222	
Dec. 31	To Balance ... ..	114	1952		
			Dec. 31 By 5 per cent Interest ... ..	12	
		£234		£234	
1953		1952			
Jan. 1	To 5th Instalment ... ..	120	Dec. 31 By Balance ... ..	114	
			1953		
			Dec. 31 By 5 per cent Interest ... ..	6	
		£120		£120	

The machines will appear on the assets side of each year's balance sheet as follows :

BALANCE SHEET—DECEMBER 31, 1949		£	£
Machines under Hire-Purchase Agreement, <i>less</i> Depreciation	...	486	
Deduct Liability in respect thereof	...	426	60
BALANCE SHEET—DECEMBER 31, 1950			
Machines under Hire-Purchase Agreement, <i>less</i> Depreciation	...	389	
Deduct Liability in respect thereof	...	326	63
BALANCE SHEET—DECEMBER 31, 1951			
Machines under Hire-Purchase Agreement, <i>less</i> Depreciation...	...	311	
Deduct Liability in respect thereof	...	222	89
BALANCE SHEET—DECEMBER 31, 1952			
Machines under Hire-Purchase Agreement, <i>less</i> Depreciation	...	249	
Deduct Liability in respect thereof	...	114	135
BALANCE SHEET—DECEMBER 31, 1953			
Machines, <i>less</i> Depreciation	...		200
(To be continued)			

## Purchase Tax Exemptions

THE National Formulary, 1949, published by the British Medical Association and the Pharmaceutical Society, has been approved by the Minister of Health for the purposes of the National Health Service with effect from May 1, 1949. As from this date, preparations appearing in the formulary, whether or not compounded with substances appearing in the monographs and formularies of the other publications specified in Provision 1 of the Ministry's Notice No. 78M

or with an excipient, vehicle, base or preservative, will qualify for exemption from Purchase Tax subject to compliance with the remaining provisions of Notices Nos. 78M or 78N.

The National Formulary, 1939, and its previous editions which were used for the National Health Insurance Scheme, and other publications such as Martindale's Extra Pharmacopœia, Squire's Companion and foreign pharmacopœias are not approved for the purpose of the exemption.



# A CHEMIST'S

## BOOKSHELF



**Manuel du Savonnier** (Manual for the Soap Maker). A. Matagrin. Third edition. 1949. Paris. Gauthier-Villars. Pp. XXIV + 450. Fr.850.

Soap manufacture on a commercial scale started in France in the 13th century with the manufacture of olive oil soap at Marseilles. The processes and extent of the manufacture were revolutionised as a result of Chevreuil's classical researches on the constitution of oils and fats and by the introduction of the Leblanc process (1791) for the manufacture of soda from brine. The progress of the industry was assisted by further improved processes of caustic alkali manufacture and by the utilisation of other vegetable oils to supplement the tallow and olive oil exclusively used in older times. After an historical chapter, this handbook and guide describes raw materials, soap-making processes, glycerine recovery and methods of analysis used in controlling manufacture and in testing finished soaps. The book is designed essentially as a practical volume for the practical soap maker. Little attention is given to the theories of saponification or detergency. The emphasis is all on the practical handling and refining of raw materials, kettle practice and other operations in the modern soap factory, everything being classified and described according to different processes and abundantly illustrated. Some folder pages show in diagrams the arrangement of complete plants and equipment.

The greater part of this third edition was written during the war under the grim conditions prevailing during the German occupation. Various shortages stopped the work and foreign research was not available.

The author has therefore contributed an addendum to the book giving the latest developments of the soap industry and thus presents the wide range of the subject in its present guise.

**Chemie und Chemische Technologie** (Chemistry and Chemical Technology). Dr. Willi Machu. 1949. Vienna: Springer-Verlag. Pp. XVIII + 758. 48s.

Dr. Machu, in a foreword, dedicates his book chiefly to engineers of all kinds and to non-chemists, but that fact does not prove that it will not have considerable value also

for students and practitioners of pure and applied chemistry. The engineer must learn to understand the language of the chemist and obtain a logical knowledge of chemical problems, as also must the chemist understand the language of the engineer. The book is based on the author's lectures at the Technical High School, Brno, and afterwards at Vienna. It covers the fundamentals of chemistry and practically all fields of its technical applications. It also considers the most important physical properties of the materials, such as solubility, crystal-system, colour, density, melting and boiling points, solidity, etc., in relation to their uses and is therefore not only a textbook but of value as a general reference book. Fundamental principles which are necessary for the understanding of the literature and of chemical reactions, such as dissociation, hydrolysis, chemical kinetics, catalysis, colloid-chemistry, complex compounds, etc., are inserted at appropriate stages. The scheme of the book is to present, after summarising general principles, studies of non-metals; metals; organic chemistry and technology, with the sub-divisions: 1, aliphatic or fatty compounds; 2, cyclic and 3, heterocyclic compounds. The final chapters deal with alkaloids, vitamins and hormones, and chemical calculations and numerous examples and their solutions. It will stand as a textbook of considerable value to all who are not debarred by the language from widening the range of their training studies.

### "Happier Days"

**A**LIVELY defence of the tradesman and a number of original views expressed with humour and acute understanding of character combine to make "Happier Days," Sir Ernest Benn's book of recollections, published this month, an entertaining volume which is peculiarly appropriate in present conditions. He deplores the present tendency to underrate the social value of the "shopocracy," which he says must be counted among the causes that have brought us down to austerity. "The professions and politicians . . . without the tradesmen, would, like Diogenes, be reduced to the contemplation of their own superiority, wholly unencumbered with the good things of life," declares Sir Ernest.



## Personal

**T**HE following officers were elected at the annual general meeting of the West of Scotland Iron and Steel Institute held in Glasgow last week: President, MR. W. BARR; vice-president, MR. H. HARRIS; hon. treasurer, MR. P. W. THOMAS; councillors: Messrs. P. T. CARTER, J. M. FERGUSON, R. M. HOWATT, W. M. SERVICE and J. H. TENNENT.

SIR NORMAN SCORGIE, until recently Controller of H.M. Stationery Office, has joined the board of A. B. Flemming & Co., Ltd., printing ink manufacturers, Edinburgh. He has become a director also of B. Winstone & Sons, Ltd., Harefield Industrial Paints, Ltd., and other companies in the group.

DR. W. E. HANFORD, director of petroleum and chemical research, has been elected a vice-president of the company, M. W. Kellogg Company, New York, which he joined in 1946 from General Aniline & Film Corporation, where he was director of research.

LORD MCGOWAN, chairman of Imperial Chemical Industries, Ltd., is to receive the honorary degree of D.C.L. from the University of Durham at Newcastle-on-Tyne on July 2.

SIR C. V. RAMAN, distinguished Indian scientist, has been elected a corresponding member of the French Academy of Sciences, Paris.

MR. G. E. BEHARRELL, managing director of the Dunlop Rubber Company, has been re-elected president of the Tyre Manufacturers' Conference.

DR. A. J. V. UNDERWOOD has been appointed a member of the committee of the Association of Consulting Engineers.

## BCPMA Appointments

The following are the officers newly appointed or reappointed to serve the British Chemical Plant Manufacturers' Association in 1949-50: chairman: MR. A. G. GRANT; Vice-chairmen: MESSRS. M. C. FRASER, W. J. HOOTON, and H. V. YORKE; hon. treasurer: MR. P. W. SELIGMAN.

Members of Council: Messrs. W. R. Beswick, J. Bishop, B. L. Broadbent, Dr. G. E. Foxwell, Messrs. E. S. Franklin, K. Fraser, Major V. F. Gloag, M.C., Messrs. J. C. Haithwaite, G. N. Hodson, R. Lessing, B. N. Reavell, J. Arthur Reavell, G. W. Riley, Dr. R. Seligman, Messrs. E. Smyth, R. F. Stewart, S. G. Watson, and J. W. Wright.

## Obituary

**T**HE debt which two great contemporary activities owe to one man is acknowledged in a memoir of the late MR. WHISTON ALFRED BRISTOW, pioneer in aviation and low temperature carbonisation. He was one of a committee of four which drew up plans for the equipment of the new American Air Force, and early in 1919 was present as a technical adviser to the British delegation at the peace conference, where his draft of the International Air Convention was unanimously accepted. Col. Bristow's name is inseparably connected with the successful development of low temperature carbonisation. He put the Parker process of low temperature carbonisation on a technically sound footing and firmly established Coalite as a domestic smokeless fuel. On that solid basis he proceeded to develop the refining of the liquid products and manufacture of chemicals from them by a long-term research and building programme.

The death occurred recently at the age of 52 of MR. W. F. ROWDEN, a director of the Climax Molybdenum Company, of Europe, Ltd. He had for some years been closely associated with the development of alloy steels, and during the war was a metallurgical adviser to the Ministry of Supply's Department of Tank Design.

## American Cyanamid Appointment

Dr. H. Z. Lechar, since 1938 associate director, of research, has been appointed director of research of the Calco Chemical Division of the American Cyanamid Company, Bound Brook, New Jersey. Dr. Lechar, a native of Vienna, served with I. G. Farbenindustrie in 1927, directing research on synthetic rubber in Leverkusen, where he played a leading part in the development of the Buna rubbers, and from 1928 to 1932 he was director of the main research laboratory in Leverkusen. He went to the U.S.A. in 1932 to direct research on dyes at Calco.

**Works Visit.**—Women employees of I.C.I. Ltd., Ardeer, visited the Caldram works of Jute Industries, Ltd., recently to see the production of yarn, which is used in the manufacture of their own Ardeer products. This policy of encouraging workers to take an active interest in the materials and uses of the products they manufacture is being developed extensively by the group.



## New Scottish Industries

### Woodpulp, Peat and Minerals

THE possibility of developing a woodpulp industry in Scotland as an industry ancillary to the expansion of forestry, has been studied on several occasions recently, and at least one Scottish paper mill is known to have active plans for a plant of this type.

The Scottish Council (Development and Industry) has now initiated an investigation into the possibilities of developing woodpulp and has appointed Dr. Thomas Sheddin, of I.C.I., Ltd., as chief chemist to the council. He has been asked to investigate the scope and outlet for a woodpulp manufacturing industry on a large scale. This would be aimed mainly at the paper and rayon industries, who are large-scale users of woodpulp, but the development would inevitably mean an expansion of the scope and use of woodpulp in Scotland.

The various using industries are prepared to establish new and substantial plants using woodpulp if they can be assured of an adequate and economic supply. The forestry people, on the other hand, can assure a good supply if guaranteed an economic outlet for the work involved. Research into this is, however, now being pushed ahead.

Fort William has been suggested as a possible site for such industries. This would have the valuable asset of ample electrical power from adjacent schemes, but paper-making people in the North-East, Central and East Scotland areas may well want such an industry located nearer to their own existing plants.

Mr. Robert H. S. Robertson, the Glasgow chemical engineer and geologist (and specialist contributor to *THE CHEMICAL AGE*) has been appointed consultant on raw materials development by the North of Scotland Hydro-Electric Board. He will investigate potential commercial operation of deposits in the area in which the board is interested and where electricity provided by the board may permit economic working of raw materials previously neglected. Among the potential materials are diatomite, feldspar, talc, serpentine, clays, sands and gravel.

The Scottish Reconstruction Committee, responsible for the campaign advocating the use of Scottish peat, reported recently that considerable developments are expected soon on this subject. All the work which has been done to date has suffered from the defect that peat products are uneconomic unless linked to a major plant producing power. Creation of a power plant on the peat bog to create electrical energy which would then be transmitted direct to the grid is, however, visualised, and when this develops by-product creation is expected to be greatly simplified and its cost reduced. The committee is urging the building of a pilot plant to cost about £51,000, which would handle 80,000 tons of peat annually.

At the Royal Technical College, Glasgow—where the board has endowed a research scholarship—scientific research will be directed by Prof. W. M. Cumming, O.B.E., Director of the School of Chemistry and Professor of Technical Chemistry.

### Scottish Report on Streptomycin

"IMPRESSIVE results" have been achieved with the use of streptomycin in the treatment of tuberculous meningitis—remembering that this disease was once almost uniformly fatal.

This view is expressed in the report of the Streptomycin Sub-Committee of the Scottish Scientific Advisory Committee, based on observations during 1947 and 1948 over a minimum period of four months on 81 patients. At the end of the period 36 (44 per cent) of the patients were alive and of these 31 (38 per cent) were progressing favourably.

It is recorded that 52 patients were given a minimum observation period of seven months and of these 20 survived and 17 were progressing favourably. Results were most immediate in the age group 4 to 17 years,

of which 58 per cent (21 out of 36) made favourable progress.

While stressing that the number of patients already treated is too small to permit of any positive decision, the advisory committee has issued its interim report because of the impressive results achieved and the fact that streptomycin is now available for all cases of tuberculous meningitis. The sub-committee consists of leading medical men from all the principal hospitals handling this type of case.

The latter are now investigating the use of streptomycin in relation to military tuberculosis but stress that its use in this field is limited to certain forms of the disease. Forty-three Scottish hospitals are now providing this type of treatment as against 20 in August, 1948, and 5 in September, 1947.



## Home News Items

**"Increasing Pollution" in Scotland.**—The petition sent by Scottish anglers to the King, urging his attention to increasing pollution of Scottish rivers, has been passed to the Secretary of State for Scotland for his attention and possible action.

**Pharmacists' Council Elections.**—Twenty candidates have been nominated for the seven vacancies on the Council of the Pharmaceutical Society of Great Britain. Six of the seven retiring members, Mrs. Irvine, Miss Islip, and Messrs. Maplethorpe, Reid, Shaw and Tristram offer themselves for re-election. The election is on May 18.

**£10 Million Engineering Contract.**—C. A. Parsons and Co., Ltd., Heaton, Newcastle-on-Tyne, has received a contract for the building of the second steam turbine required for the Ontario Hydro-Electric Commission's new £10 million plant at Toronto, Canada. The company already has in hand orders worth £1.2 million for the commission.

**Purchase Tax on Liquid Soap.**—The Commissioners of Customs and Excise have announced that liquid soap made from refined and deodorised oils and fats is to be chargeable with Purchase Tax at the rate of 33½ per cent in all circumstances. Such soap as household cleanser, or made from crude oil, is to be exempt.

**Business Telephones.**—Priority for the provision of telephone service is given to essential requirements of Government departments, public utilities, health and life-saving services, firms engaged on production and distribution for export or for saving imports, and farmers. Subject to these broad categories of priority, business applicants are in general given preference over residential applicants, states the *Post Office News Bulletin*.

**The Gas Turbine and Industry.**—The Ministry of Supply has set up a development committee to consider the industrial applications of the gas turbine. The committee, under the chairmanship of Sir William Stanier, chief mechanical engineer, London Midland Region, British Railways, will keep the matter under continuous review and recommend further research or development considered necessary. Members of the committee include: Air Commodore Sir Frank Whittle, pioneer of the jet engine; Professor O. A. Saunders, Imperial College of Science and Technology; Sir Henry L. Guy, Institution of Mechanical Engineers; and Rear Admiral D. J. Hoare, director of research, British Internal Combustion Engine Research Association.

**DDT Campaign.**—Glasgow Corporation Public Health Department is launching a DDT campaign against flies, as bearers of disease, and extra staff is being recruited to handle the work of spraying dustbins and other potential breeding grounds. The campaign is scheduled to start next month.

**Population Figures.**—A new publication showing the latest estimates of local populations as at June 30, 1948, is issued to-day by the Registrar General. Total population is given as 43,502 million (males 21,091 and females 22,411). Greater London is shown as having 8,282,217 million population.

**Steel Industry Exhibition.**—To attract the right kind of recruits to the industry and exhibition, organised by the Iron and Steel Federation was opened in Sheffield last week. Among the exhibits were working models of a 6000-ton press; a drop stamp forge, steel melting plant, rolling mills and an open-hearth furnace.

**Scottish Fluorine Action.**—The recent action in the Scottish Court of Session was recalled last week, when Lord Birnam awarded expenses to the Ben Nevis Distillery Company (Fort William), Ltd., and Mr. Joseph Hobbs, managing director, against the British Aluminium Co., against which action had been taken for interdict to prevent the harmful emission of fluorine.

**Housing May Hamper Expansion.**—The inadequacy of official house building programmes, in the light of industrial expansion in certain areas, is reflected in discussions between local authorities at Ellesmere Port and the Shell Refining & Marketing Company. The authority has been authorised to build 2000 houses in five years and to allocate up to 33 per cent to "sponsored" industries. The local oil industry alone is expected to need some 1200 houses. It is not certain local builders can provide even the 400 houses annually.

**Census of Distribution.**—The census of distribution which was postponed from January, 1950 (*THE CHEMICAL AGE*, 60, 205), is to be taken instead in 1951 in respect of distributive and other service trades in the calendar year 1950. Specimen census forms, indicating the kind of information required, may be obtained on application to the Board of Trade Census of Distribution Office, Romney House, Tufton Street, London, S.W.1, by any trader whose business year begins during 1949. Those whose business year does not begin before January 1, 1950, will be able to obtain specimen forms in the autumn of this year.



## American Chemical Notebook

(From Our New York Correspondent)

**T**WO Government-owned patents have just been made available for non-exclusive and royalty-free licensing by the U.S. Patent Office. The first, No. 2,424,552, covers a method of concentrating non-metallic ores by froth flotation. Anionic collecting agents are employed to float activated siliceous gangue constituents from caustic alkaline ore pulps with a pH of from 10 to 12. Flotation of such non-metallic minerals as calcium phosphate, calcite, barite, strontianite, and witherite is retarded with a soluble inorganic metaphosphate or polyphosphate. Siliceous gangue is floated and the non-metallic mineral is separated and recovered. The second patent, No. 2,449,071, relates to a method of producing a catalyst for the synthesis of hydrocarbons. An aqueous solution of an alkaline precipitant is added under good agitation to a hot dilute aqueous solution of a ferric salt. The material, washed and dried, is crushed to a fine powder and pressed into tablets such as are employed for catalysts used in the hydrocarbon synthesis process.

\* \* \*

U.S. production levels for January of industrially important inorganic chemicals were generally lower than those reported for December last, but were higher than for January, 1948, according to the U.S. Bureau of the Census. Decreases from December, 1948, quantities were reported for 19 of the 35 chemicals included in the continuous monthly survey, while increases were reported for 13. Twenty-one of the 35 chemicals were produced in larger quantities during January, 1949, than during January, 1948, while 11 were produced in smaller volume. Record high production levels were reported in January for sodium bichromate and chromate (8913 short tons) and disodium phosphate (11,407 short tons). Of the "heavy volume" chemicals, decreases of 8, 5 and 3 per cent respectively were reported for production of soda ash, caustic soda, and sulphuric acid.

\* \* \*

On April 8, nearly two years from the day its styrene plant was destroyed by the explosion of the nitrate-laden s.s. *Grandcamp*, the Monsanto Chemical Company's reconstructed Texas City plant was officially re-opened in the presence of company officials and invited guests. A feature of the ceremony was the unveiling of a memorial to the 145 Monsanto employees who lost their lives in the disaster. The granite obelisk

on which the names are recorded, bears the words: "The physical part of the men and the plant has gone, but not the products of their minds—these will live on." The dedication ceremonies included a symposium relating to the new plant and the conservation of the petroleum and chemical resources of Texas.

\* \* \*

The world's second largest cyclotron, more than 1000 tons of steel built at a cost of \$1.5 million, was dedicated last week at the University of Rochester, Rochester, N.Y., by Dr. Lee A. DuBridge, president of the California Institute of Technology, Pasadena, California. He said: "What this cyclotron will certainly do is just one thing—it will yield to the skilled scientists who work with it new knowledge about the behaviour, the structure and the characteristics of nuclei. And sooner or later this new knowledge will have striking, important and valuable uses to men."

\* \* \*

Utilising reduced power consumption and less heavy equipment for processing operations, a new product known as Plastorub, natural rubber prepared for special purposes, has been introduced to the American market by the Scofin Company, Ltd., of Malaya. Uniform in certain important chemical and physical properties, the rubber will enable manufacturers to dispense with certain processes, thereby speeding production, it is stated by Latex Distributors, Inc., of New York. Plastorub is a modified rubber chemically plasticised in its liquid latex form before it is sheeted and dried on the plantation. At the consuming factory it is ready for final processing in a fraction of the time it takes to prepare standard smoked sheets, it is claimed.

\* \* \*

Undeterred by some slackening in business, the National Aniline Division of the Allied Chemical and Dye Corporation has announced its intention to go ahead with construction of a new \$2.5 million dyestuff plant at Buffalo, New York. The allocation of funds for the new project brings to \$10 million the total set aside for plant expansion by the company during the past five years. Some reduction in demand for dyestuffs and other of the company's products resulted in several hundred employees being laid off late in 1948. Now about 2500 are employed and steadier conditions are reported.



# French Home and Export Chemicals

## Most Targets Exceeded

IN a recent address by M. Bourdon, of the Union des Ind. Chin., it was pointed out that in 1938 the chemical industry ranked fourth among the major industries of France—after engineering, metals, and textiles; it was also fourth among the nations of the world, and gave employment to about 250,000 people.

With an output valued at 11,000 million francs, or 8 per cent of the world total, it is stated to have been exceeded only by the U.S.A., Germany, and Great Britain, whose shares were respectively 35-40, 16, and 10 per cent. French output inevitably was reduced during the war, but has made rapid recovery. The following are some of the monthly production figures (in 1000 tons):—

	1945	1947	1948
Sulphuric acid ... ..	23	88	105
Sodium carbonate ... ..	10	49	62
Calcium carbide ... ..	6	12	18
Superphosphates ... ..	19	117	150

Generally, production now exceeds that of 1938, and if that year be taken as 100 the present index is 137.

In regard to exports the figures show unmistakable revival. In 1938 Germany took first place, followed by the U.S.A., Great Britain, and France. Total French chemical production, by weight, was about 1.74 million tons, valued at 2090 million francs, of which 615 million francs were exports, ranking third in the country's export total. In 1947 the volume was slightly greater at 1.77 million tons, representing a value of 20,500 million francs, of which 14,943 million francs represented exports (excluding those to French overseas dominions).

Exports were thus about one-tenth of the French total and a substantial contributor to foreign exchange resources.

The chemical industry has, in fact, exceeded the target set by the Monnet Plan by 28 per cent. The chief export values in 1947, in million francs, were:—

Potassium chlorides ... ..	3017
Sodium carbonate and hydroxide ... ..	1720
Essential oils ... ..	1400
Pharmaceuticals ... ..	1116
Dyes, etc. ... ..	945
Potassium sulphate ... ..	390
Activated carbons ... ..	367
Potassium carbonate ... ..	230
Superphosphates ... ..	1303

Replying to complaints of high prices of chemical products, M. Bourdon said that, taking into account the depreciation of the franc and general level of world chemical prices, the French prices were not unreasonably high. However, in considering the foregoing figures, the change in values cannot be regarded as unimportant.

The use of 1938 as an accounting basis is not entirely satisfactory; output of chemicals at that time was at a relatively low level. France still remains comparatively poor from the point of view of chemical industry, and still more strenuous efforts will have to be made to bring about a high level of production and prosperity. The Marshall Plan will, of course, assist in this direction, but too much must not be expected from that source.

In a later market report it is stated that French chemical prices are in many sections too high and unable to compete with those of foreign manufacturers.

## SANDOZ SEEKS NEW OUTLETS

THE annual report for 1948 issued by Sandoz, Ltd., Basle, indicates that the company intends to cultivate hitherto under-supplied markets and to earmark large expenditure for the improvement of manufacturing and working methods. Costs have risen, because of higher prices of raw materials and increased wages, and the return of severe competition in almost all markets is noted.

The dyestuffs business developed favourably last year, despite Continental trading difficulties. Trade lost in Belgium and China has been compensated by higher sales in other European and overseas territories, but a decline in demand was noticeable in the last quarter of 1948 and has been more marked in the first months of this year.

## DURBAN OIL REFINERY

THE choice of Durban for an oil refining undertaking with a capital of £5 million has been announced by Mr. Harold Moore, managing director of the Union Petroleum Refinery (Pty.), Ltd., who said that his company would go ahead on the completion of negotiations now in progress.

Durban had been selected as the most suitable position in the Union in which to conduct refining operations. "We have already got our engineers here. To-day there is a tendency throughout the world to establish refineries to handle crude imports rather than import the refined product itself." In the United Kingdom, for example, it is planned within the next three years to carry out nearly all refining on the spot.



# German-British Trade Agreement

## Chemical Exports and Imports of Anglo-U.S. Zone

CONSIDERABLE importance is being attached in the German chemical industry to recent trade agreements, of which that with Great Britain provides for chemical exports from the Anglo-U.S. occupation zone to the value of nearly £870,000, exclusive of shipments to British colonies. British chemical exports to the combined zone, on the other hand, which will aggregate around £950,000 by the end of June, will consist largely of oils and fats, shellac, casein, copal, etc.

Generally, the JEIA agreements provide for substantial imports of raw materials for the chemical industry. Pyrites is coming in now from Spain, Norway and Greece, and special arrangements have been made for shipment of phosphates for the Ruhr area through the ports of Rotterdam, Amsterdam and Emden.

Shortages of raw materials are still serious in various directions, and new ways are being sought to overcome them. Thus, rayon manufacturers are exporting large quantities of yarns in order to facilitate imports of caustic soda. The Bavarian china industry, which in the past relied partly on china clay from Czechoslovakia, hopes to use instead local clays refined by a process developed by the Rosenthal china works at Selb, Upper Franconia.

### Coal By-products

While the production of coal continues to increase, that of coke and by-products has not risen any further of late because of official restrictions, and efforts are therefore being made to release a larger percentage of the total output of coal-tar and other products for chemical purposes.

In the glass industry difficulties have arisen as a result of increased competition between firms in the Rhineland and in Southern Germany. The manufacture of medicinal and laboratory glassware in Bavaria has consequently declined, but the window glass capacity is still fully utilised. As hollow glassware from Thuringia is no longer available for Western Germany, plans have been drawn up for its manufacture in South Wuertemberg and Baden.

Thermos flasks are being made in the former aluminium mill at Wutoschingen, and Gebrueder Giuliani, of Ludwigshafen, which used to supply alumina for the Wutoschingen plant, has also installed glassmaking plant and is now employing skilled workers from Silesia and the Sudeten districts.

The aluminium industry was seriously affected by the shortage of electricity in December and January, but production has since recovered in the two Bavarian plants at Lueenen and Toeing, and other aluminium works are also being put into commission. A number of Bavarian firms which are producing calcium carbide and other electrochemicals have made separate arrangements to prevent a repetition of the difficulties which occurred during recent winters, but it is feared that these will greatly add to their production costs. The monthly turnover of the Bavarian electrochemical industry is said to amount to some DM 35 million at present.

### Potash

The production of potash salts has been resumed at the Sigmundshall pit near Wunstorf at a daily rate of 300 tons, which is to be raised to 500 tons when the boiler plant has been completed; the pit had been closed for the past 18 years. Preparations are also being made to resume production in the Koenigshall and Hindenburg pits, near Goettingen, which are flooded. Substantial progress is reported in the repair work at the Riedel potash works, which were wrecked by an explosion two years ago. Other potash mines have increased their production figures recently, and some salt mines are changing over to the production of potash salts.

The economic plan of the Soviet zone economy for 1949 provides for an increase of chemical production by 20 per cent over 1948. Little is known about the production targets for individual branches of the chemical industry, but special importance is apparently attached to chemical raw materials and fertilisers. The nitrogen plants are engaged in an output competition, and the Leuna plant is to produce 180,000 tons of nitrogen.

Extensive uranium deposits are reported to have been discovered in the Oelsnitz area, which are said to be geologically connected with the deposits at Aue, Saxony, and Joachimsthal, Czechoslovakia.

**Turkish Chrome Ore.**—A project to increase the output of the Government-owned Guleman chrome-ore mines by 66,000 tons this year, has been submitted to the ECA mission in Ankara. Hungary is said to be negotiating to purchase 50 per cent of the total output for this year.



## SCI Food Group

THE annual report of the Food Group of the Society of Chemical Industry for the year 1948-49, just issued, indicates a further increase in membership, as at January, 1949, of 32, compared with the previous year, making the total 1069. Membership of the Microbiological Panel advanced by 77 to 427, and the Nutrition Panel increased from 280 to 320.

Arrangements for the next session are stated to be already nearing completion. The summer tour will begin on June 10, when the party leaves for the Bordeaux district. In the autumn the scientific programme will begin with a two-day conference on "Amino Acids and Protein Hydrolysates" opening on September 28.

## LETTER TO THE EDITOR

### "Progressive Policy in Germany"

SIR—Your issue of April 2 contains certain statements with which I, as a consultant on European trade, cannot agree as accurate.

In particular, I notice the report on page 479 with regard to the aluminium industry. The Töging works of Vereinigte Aluminiumwerke is not at present the only aluminium plant in operation in Western Germany. The works of the same company at Lünen in Westphalia came into production in February and is steadily increasing its output from the initial 260 tons in that month. The aluminium producing works at Rheinfelden in the French zone owned by Aluminium Suisse S.A. has been producing on a small scale for the past twelve months and expects to increase its output almost immediately to 1000 tons per month.

The possible production at the Töging works is of the order of 24,000 tons per annum and not 38,000 tons, as given in your article, and, after a small initial production in April, 1948, it reached a peak in August of 1500 tons (not 2000 tons), and the plant was closed down in October by reason of lack of water power and the inability of the grid to provide for any appreciable production. The plant was put into operation again in March of this year, but the shortage of water leaves the production to be anticipated problematical.

Imports of aluminium come almost entirely from Canada, some admittedly *via* Switzerland, but I know of no import from Italy. The Lünen plant, which is now steadily increasing its output, will be capable, with the available power supply, of approximately 1000 tons per month and not 300 tons of virgin aluminium per annum as stated in your article.—Yours, etc.,

Kensington, S.W.7. T. W. VIGERS.

## Crop Protection Congress

AN International Congress on Crop Protection will meet in London at the Imperial College of Science and Technology South Kensington, from July 20-29. Many distinguished chemists and chemical engineers will be taking part, under the presidency of Lord Bledisloe. A provisional programme has now been issued giving the meetings of the six sections, the congress lectures, and visits to research stations and laboratories.

The six sections with their Presidents of Honour are as follows:—Insecticides: Sir Ian Heilbron (Great Britain); fungicides: Prof. H. Osvald (Sweden); plant growth regulators: Prof. W. H. Schopfer (Switzerland); toxicology of crop protection substances: Dr. R. Pontiers (France); methods of application: Dr. James G. Horsfall (U.S.A.), and analytical methods and standardisation: Prof. R. Mayné (Belgium).

There will be a finance committee under the chairmanship of Prof. E. C. Dodds, a scientific papers committee with Sir Jack C. Drummond as chairman, and a book exhibition with Mr. A. Cockburn Townsend as director.

## NEXT WEEK'S EVENTS

TUESDAY, APRIL 19

**Society of Dyers and Colourists.** Huddersfield: Field's Café, Westgate, 7.30 p.m. Prof. W. Bradley: Lecture.

WEDNESDAY, APRIL 20

**Royal Institute of Chemistry** London: London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 3 p.m. Symposium: "Standardisation in the Chemical Field," opened by W. J. Cence.

FRIDAY, APRIL 22

**Institution of Chemical Engineers.** London: Mayfair Hotel, 11 a.m. Annual meeting. Noon: Presidential address: "Scientific communication"; evening: dinner and dance.

**Society of Glass Technology.** St. Helens: Gas showrooms, Radiant House, 7.15 p.m. R. J. Callow: "Opal Glasses."

**Royal Institute of Chemistry.** Birmingham: University, Edmund Street 7.30 p.m. Joint meeting with Birmingham Metallurgical Societies. Dr. W. H. J. Vernon: "Metallic Corrosion and Corrosion Prevention."

**Textile Institute.** Manchester: 16, St. Mary's Parsonage, 6 p.m. F. S. Winterbottom: Lecture.

**Society of Chemical Industry** (Fine Chemicals Group). London: King's College, Strand, W.C.2, 7 p.m. J. D. Kendell: "The Chemistry of Photographic Sensitising Dye stuffs"



## Overseas News Items

**Powell Duffryn in Pakistan.**—Powell Duffryn Technical Services has undertaken to survey the coal resources of Pakistan. A team of the firm's technicians arrived there recently.

**Dutch-American Collaboration.**—The Dutch synthetic resin works, Synthese N.V., The Hague, has entered into an agreement to secure close co-operation with Reichhold Chemicals, Inc., of Detroit, U.S.A.

**Electronics Fellowship for Indian.**—An Indian professor, Mr. D. D. Kosambi, of the Tata Institute of Fundamental Research of Bombay, has been given a UNESCO fellowship to work on the new types of electronic calculating machines, for setting up a modern calculating laboratory in Asia.

**Uranium Ore in British Guiana.**—A report from Georgetown states that large deposits of uranium-bearing ores have been discovered in the interior of this British colony in South America. First claim has been granted by the British Guiana Government to an American to search for radioactive ores in a two square mile area in the Kanuku mountains. This followed the recent discovery by a hinterland rancher of euzenite, the uranium bearing mineral, in the Rapununi district.

**End of U.S. Steel Shortage Predicted.**—An end of the steel shortage in about six months was forecast by a spokesman of the industry in Washington last week. Increases in the export quotas for eight iron and steel wire and sheet metal products for the second quarter of 1949 were announced by the Department of Commerce. Improved supplies and lower prices were due to the expansion of production rather than to falling demand. Production of steel ingots last year amounted to 88.5 million net tons, compared with 79.7 million in 1945 and approximately 67 million in 1940. This year output is expected to be well above 90 million tons.

**C.I.L.'s New Acid Unit.**—The unconventional new \$1.25 million sulphuric acid unit, thought to be the most advanced of its kind, has been officially opened at Hamilton, Ontario, by Canadian Industries, Ltd. It will yield approximately 250 tons of acid daily in varying concentrations and may increase Canada's annual sulphuric acid production by about 30,000 tons. The compact structure is known as a "building-less" plant as most equipment is outdoors. Steam generated in processing the sulphur supplies heat required in the manufacturing process and for the small adjacent building housing the control panel and change room for employees.

## Electrolytic Metal Polishing

### Confirms the Jacquet Theory

**C**ONFIRMATION of some of the findings, published by the pioneer French worker Jacquet, on the principles underlying electrolytic metal polishing is incidentally presented in the course of American studies undertaken by the University of Colorado. These, initiated in the interest of a Colorado firm employing the electrolytic method in the polishing of small brass fittings, were recently described to the American Chemical Society by Dr. H. F. Walton, of the university.

### Viscous Film

Dr. Walton called attention to the fact that during electrolytic polishing of brass or copper in a phosphoric acid bath, the anode surface becomes coated with a very viscous film, rich in metal salts. Jacquet has suggested that this film is responsible for controlling the polishing effect.

The American work confirms this theory of Jacquet as far as the polishing of copper in phosphoric acid media is concerned. First, the viscous film was removed with a squeegee and analysed. It is a saturated or nearly saturated solution of copper phosphate, with a water content about the same as that of the bulk of the solution—usually some 20 per cent by weight.

Next, the viscosities of solutions of copper phosphate in phosphoric acid and mixtures of phosphoric acid with ethylene glycol, or glycerol, or both, were measured. Copper was found to increase the viscosity of these solutions very considerably. One per cent of copper by weight increased the viscosity of phosphoric acid by 26 per cent, that of a glycerol-phosphoric acid mixture by 38 per cent.

According to Jacquet, the polishing efficiency should be greater in proportion to the viscosity gradient in the anode layer. That is, these solutions should give the best electro-polishing in which the copper salt is as soluble as possible and at the same time raises the viscosity as much as possible for a given percentage of copper.

From the results now presented this seems to be the fact and it is hoped therefore to have a way of telling in advance whether a new solution will give good electroplating.

Agitation, or movement of the metal relative to the solution, should also effect electroplating, it was reported, since the faster the motion, the thinner the viscous layer. Ideally, this layer should be about as thick as the height of the projections on the surface being polished. It is found that, up to a point, the faster the specimen is moved the better the polishing; but if the motion is too fast, the anode layer has no chance to form, and etching occurs.



# WORLD MARKETS IN 1948

## Continued Expansion Reported by Ciba, Ltd.

**T**HE report for 1948 of Ciba, Ltd., Basle, states that, in spite of the increasing sales resistance, results have been only slightly less favourable than those for 1947. The high level of business activity in the Swiss chemical and pharmaceutical industry, which has made possible a continuous intensification both of output and sales of the group, has, on the whole, been maintained.

Ciba has succeeded in broadening its commercial and technical basis as a result of the expansion of works at home and abroad and by further development of its world-wide organisation.

### Dyestuffs and Auxiliaries

The report observes that the past year marked a turning point in the international dyestuff market, because requirements could be adequately met for the first time since the end of the war. Demand for dyestuffs by the textile, leather and paper industries was still active, but the prosperity of these industries has passed its peak, at any rate in Western Europe and in the U.S.A. Import and payments difficulties and competition from the leading foreign dyestuff industries—which have increased their productive capacity since the war and which often enjoy the advantage of more favourable costs—has to be reckoned with. Interest has again been concentrated on vat dyes and specialities, and there has been an increase in the demand for high-grade dyestuffs. Request for special dyestuffs for union fabrics is again rising.

The revival of competition has been noticeable in the increasing difficulties connected with the registration of patents in important industrial countries. The report makes special reference to Neolan Violet 5BF and to Synchromate Red BNL, a fast dyestuff which dyes in specially brilliant shades.

Demand for the Ciba's pharmaceutical specialities is stated to have been maintained during 1948 in the majority of important markets. Manifold trade difficulties and State regulations affecting the trade and use of pharmaceuticals have impeded the flow of supplies, and increasing competition from abroad has led to breaks in the price structure. The report also makes reference to the attempts made in a number of important markets, in pursuance of nationalistic tendencies, to interfere with the group's patents.

The group's plastics section has noted a

decline in domestic prosperity and the increasing competition from abroad. Co-operation with Aero Research, Ltd., Duxford, Cambridge, is stated, however, to have resulted in an expansion of foreign connections. Research has been concentrated on the improvement of manufacturing methods and on the application of plastics, such as the use of melamine resins in paper manufacturing as well as in pressed products.

Ciba's foreign subsidiaries are stated to have expanded plants without any large recourse to the Swiss parent. Special mention is made of Cincinnati Chemical Works, Inc., Cincinnati, U.S.A., which has reported higher output and sales, and of the Clayton Aniline Co., Ltd., Clayton, Manchester, which has also made good progress with its expansion plans. In spite of difficulties in the British home market, there has been an expansion of trade of the Ciba Laboratories, Ltd., Horsham, as a world supplier of Ciba special products.

### Continental Subsidiaries

The Ciba's Continental subsidiary companies have also expanded their activities last year and new equipment is being installed at the French subsidiary in St. Fons. The Società Bergamasca per l'Industria Chimica, Seriate, Italy, has considerably expanded its capacity. It is acknowledged that efforts made to prevent the nationalisation by the Polish Government of the Company for Chemical Industry, Pabianice, Poland, must be considered as having definitely failed. Negotiations regarding compensation are in progress.

### Seasonable Colours

Eight colours are presented for nylon, principally for stockings, on the British Colour Council Card for 1949. They were selected in close consultation with the hosiery trade, to co-ordinate with dress materials and leather colours.

This card illustrates the trend for darker hosiery now fashionable with the longer skirts; only a few pale colours are shown—Naturelle, a clear sunny colour, Gipsy, a clear golden beige, Fantasy, warm beige, and Serenade to harmonise with blues, browns and black. The vogue for dark subtle shades is illustrated by Wine Mist, Silhouette, Hula and Brown Shadow.



## Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

### Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced.)

**B. & T. (PLASTICS), LTD.,** London, S.E. (M., 16/4/49.) February 22, £3500 debenture, to British General Manufacturing Co (1941), Ltd.; charged on certain plant, machinery and tools as specified in schedule to debenture and a general charge. \*Nil. October 30, 1947.

### Satisfactions

**BARTON REFINERY, LTD.** (formerly MANCHESTER OIL REFINERY, LTD.), London, E.C. (M.S., 16/4/49.) Satisfaction, March 4, of letter of charge registered February 10, 1942.

**CUTLER HILL COLOURS & CHEMICALS, LTD.,** Southport. (M.S., 16/4/49.) Satisfaction, March 3, of mortgage registered March 14, 1925.

**MERRIGLO (PLASTICS), LTD.,** London, S.W. (M.S., 16/4/49.) Satisfaction, March 4, of debenture registered June 23, 1948.

**NORDAC, LTD.,** London, W. (M.S., 16/4/49.) Satisfaction, March 2, of debentures registered April 8, 1946 (the balance of the series having been cancelled).

## Company News

The board of **Sandoz A.G.**, the Swiss producers of chemicals, dyestuffs and pharmaceuticals, reports a net profit for 1948 of 12,256,742 Swiss francs. A dividend of 100 Swiss francs per share (gross) is to be paid.

## New Companies Registered

**Baco Distributing Co., Ltd.** (466,350). Private company. Capital £1000. To acquire the business of manufacturers of chemical products carried on at Abbey Manufacturing Estate, Mount Pleasant, Alperton; and to carry on the business of manufacturers of chemical products, etc. Directors: L. Bailey, S. F. T. Bailey. Reg. office: 69 Leadenhall Street, E.C.3.

**Arthur Brooke, Ltd.** (466,706). Private company. Capital £100. Factors of degreasants, dispersants, solvents and compositions for the removal of oil, carbons and all corrosives from metals, removal of paints, lacquers, etc.; sellers of chemicals for dust-proofing and waterproofing concrete, bituminous or other paints, etc. Directors: A. Brooke, L. R. Honnarty. Reg. office: 47 Corn Exchange, Leeds, 1.

**Chaseside Industries, Ltd.** (466,267). Private company. Capital £5000. To acquire the business of vitreous enamellers, electric arc and spot welders, etc., carried on as "Chaseside Industries." Directors: F. W. Williams, F. L. Male, N. Male. Reg. office: Chaseside Works, East Cannock Road, Hedgesford.

**Gorotex, Ltd.** (446,390). Private company. Capital £1000. Manufacturers of plastics, etc. Reg. office: 13 Essex Street, W.C.2.

**Frank McConnell & Co., Ltd.** (N.I.2,652). Private company. Capital £1000. Manufacturers of chemicals, gases, drugs, etc. Directors: F. McConnell, P. McConnell both of Gortin, Omagh.

**Osteel, Ltd.** (466,677). Private company. Capital: £1000. Dealers in ferrous non-ferrous and precious metals, minerals, ores, chemical products, etc. Directors: B. Erber, J. F. Johnston. Reg. office: 19/25 Croyley Street, N.1.

**Plastube Holdings, Ltd.** (466,680). Private company. Capital £100. Objects: To acquire and amalgamate the undertakings of Plastubes, Ltd., and Plastube Manufacturers, Ltd., to acquire patents for invention relating to plastic tubes, etc. Director: C. Depinna. Reg. office: Victoria House, Southampton Row, W.C.1.

**Thomas Hill-Jones (Holdings), Ltd.** (466,692). Private company. Capital £100. Importers and manufacturers of charcoal, graphite, ivory black, manganese, dioxide, chemicals, etc. Directors: T. W. Miller-Jones, W. S. Lloyd Willey, Lady K. Miller-Jones, and S. C. Kiver. Reg. office: Invicta Works, Bow Common Lane, E.3.

## Chemical and Allied Stocks and Shares

**D**ISAPPOINTMENT that the Budget has brought no tax reliefs has been reflected by a lower trend in industrial shares and a sharp marking down of shares of companies which had risen in anticipation of purchase tax reductions. Satisfaction was expressed in the City at the concession in respect of wear and tear on new plant for tax purposes, and also



with the abolition of the bonus tax. The latter will be of assistance to companies wishing to raise more capital, but all capital increases are still subject to the approval of the Capital Issues Committee.

Chemical and kindred shares have reflected the dull and uncertain trend in evidence in industrial shares at the time of writing. Imperial Chemical have come back moderately to 45s., but Monsanto have been steady at 57s. 6d., although Anber Chemical 2s. receded to 7s. 3d. Albright & Wilson were 29s. 9d., Boake Roberts steady at 20s. 6d., and Fisons 52s. 6d. Burt Boulton & Haywood kept at 27s. 6d., and W. J. Bush were quoted at 82s. 6d. William Blythe 3s. shares remained active around 21s. 3d. awaiting the financial results, and Brotherton 10s. shares were around 20s. 3d. Bowmans Chemicals 4s. shares were again at 7s., L. B. Holliday  $4\frac{1}{2}$  per cent preference were 22s.  $4\frac{1}{2}$ d., and British Chemical & Biologicals 4 per cent preference at 20s. 9d.

The 4s. units of the Distillers Co. receded to 27s. 6d. and activity in Associated Cement (79s. 6d.) quietened down, awaiting the financial results. British Plaster Board were 23s. The big profit increase reported by British Oxygen strengthened the shares to 99s.  $4\frac{1}{2}$ d.; the market is talking of a possibility that the full results or annual meeting may refer to the company's future capital plans.

British Aluminium at 47s. 6d. have strengthened in response to the higher price of aluminium, and an improvement in Amalgamated Metal to 20s. was partly attributable to hopes that the London Metal Exchange may be reopened before the end of the year. Goodlass Wall & Lead Industries shares have been firmer at 33s., awaiting the financial results.

A sharp rise in United Molasses to 45s. 3d. was attributed to the market view that the company can be included among those which could distribute a bonus. British Glues & Chemicals 4s. shares changed hands around 17s. 9d.

Shares of companies with interests in plastics were inclined to ease after their recent improvement. British Xylonite, however, kept at £5. Kleemann were back to 17s. 5d., and British Industrial Plastics 2s. shares 6s., but De La Rue eased to 36s. 9d.

Glaxo Laboratories have been active among shares considered in the market to offer bonus prospects, but at £22½ have not held all the earlier advance. British Drug Houses 5s. shares changed hands around 8s.

Boots Drug have been active around 53s. 6d., Beechams deferred were 16s., and Sangers 32s. 1½d. General Refractories at

24s. 6d. have been active on further consideration of the full results and higher dividend. Tube Investments strengthened to £6½, but Triplex Glass eased to 22s. Shell, Anglo-Iranian and other leading oil shares reflected recent profit-taking.

## British Chemical Prices

### Market Reports

MANCHESTER.—Business in chemical products on the Manchester market during the week has continued on steady lines in respect of most of the leading sections. A quiet spell is, as usual, anticipated during the greater part of Easter week. The recent reductions in lead and zinc products have so far had little effect on the demand, which has remained steady, with available supplies being fully taken up. In other sections of the market prices have shown little movement. There has been a steady call for supplies of most of the fertiliser materials and there is now keen pressure on makers for deliveries.

GLASGOW.—The demand for certain coal tar products in the Scottish chemical market continues to increase, as certain new industries get into production. There is little change, however, in the demand for other chemicals and conditions are still quiet. There have been no noteworthy changes in the supply position or in prices during the last week. There has been rather less activity on the export market.

## Industrial Accidents and Diseases

There were only four fatal accidents in February in factories manufacturing chemicals, oils, soap, etc. This was the same figure as the previous month and compares favourably with other industries shown in the *Ministry of Labour Gazette* for March, 1949. No deaths were reported from industrial diseases, but the following cases were recorded:—lead poisoning (shipbreaking)—one. Toxic anaemia—two. Anthrax (handling and sorting hides and skins)—two. Epitheliomatous ulceration (skin cancer) pitch industry, three; tar industry, six; and oil industry, one, making a total of ten. Chrome ulceration was responsible for twelve cases, three in the manufacture of bichromates, and nine in chromium plating.

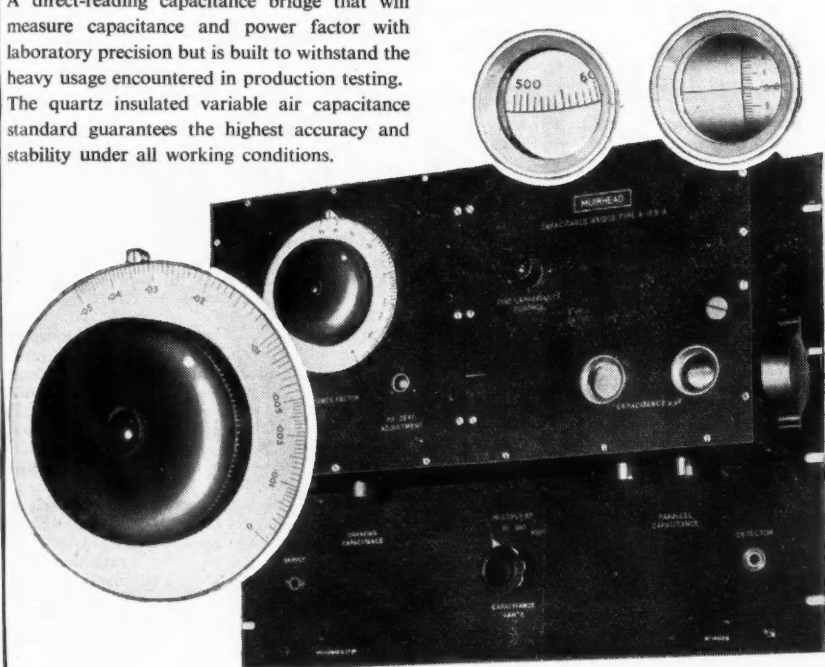
### Dyestuffs Production Since 1938.

Figures of dyestuffs production in Britain were given as 20,000 tons in 1938 and 46,000 tons in 1948, by Geo. E. Holden, president of the Society of Dyers and Colourists, speaking at the society's annual dinner in Glasgow.



# Laboratory Precision in Production Testing

A direct-reading capacitance bridge that will measure capacitance and power factor with laboratory precision but is built to withstand the heavy usage encountered in production testing. The quartz insulated variable air capacitance standard guarantees the highest accuracy and stability under all working conditions.



## SPECIFICATION:

Modified Schering Bridge, double screened and direct reading in capacitance at any frequency between 50 c/s and 10 kc/s. Direct reading in power factor at 1 kc/s; a simple correction is necessary at other frequencies.

## RANGES:

Capacitance : 100  $\mu$ F to 1  $\mu$ F on 4 ranges.

Power Factor : 0 to 0.05 at 1 kc/s.

## CAPACITANCE STANDARD:

High quality quartz insulated variable air condenser with precision worm drive gives discrimination to 0.2  $\mu$ F. Directly calibrated in  $\mu$ F from 100 to 1,000; measurements outside the normal ranges may be made by the substitution method.

## ACCURACY:

Capacitance :  $\pm 0.1\%$  of full scale reading on all ranges.

Power Factor : by direct reading :  
 $\pm 0.0003 \pm 3\%$  of scale reading.  
 by substitution :  
 $\pm 0.00005 \pm 3\%$  of scale reading.

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## Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2, at 2s. each. Higher priced photostat copies are generally available.

### Complete Specifications Accepted

Treatment of threads, fabrics, sheets and like materials composed of or containing regenerated cellulose.—S. M. Edelstein. Oct. 26, 1943. 617,868.

Manufacture of activated carbon.—M. S. Chowdhery. Jan. 11, 1945. 617,869.

Production of oils, sizes and the like for application to animal, vegetable and synthetically prepared fibres.—V. Weinberg. July 20, 1945. 617,598.

Plant for dealing with loose granular and like materials in manufacturing and processing operations.—Dunlop Rubber Co., Ltd., and H. Willshaw. Aug. 11, 1945. 617,875.

Phenolic resin adhesive.—I. F. Laucks, Inc. Oct. 4, 1944. 617,506.

Electrical vaporisation of liquids.—G. W. Watson. Sept. 21, 1945. 617,877.

Resin moulding compositions.—I.C.I., Ltd., and T. Ward. Nov. 15, 1945. 617,605.

Heat-exchanging apparatus.—G. A. L. Soc. des Appareils. July 20, 1944. 617,606.

Process of manufacturing basic calcium chlorate and basic calcium chloride from solutions containing both calcium chlorate and chloride.—Solvay & Cie. Dec. 20, 1944. 617,778.

Compositions comprising halogen-containing high molecular substances.—N.V. de Bataafsche Petroleum Maatschappij. Sept. 29, 1945. 617,508.

Process for the manufacture of copolymerisation products of homogeneous composition.—N.V. de Bataafsche Petroleum Maatschappij. Aug. 28, 1945. 617,891.

Process for the preparation of fatty  $\alpha$ ,  $\alpha$ -dialkyl ethylenic acids.—Laboratoires Français de Chimotherapie. Aug. 4, 1944. 617,892.

After-treatment of copolymers.—J. C. Arnold. (Standard Oil Development Co.) Jan. 15, 1946. 617,779.

Means for determining certain factors influencing the properties of foams.—N. O. Clark. Jan. 16, 1946. 617,609.

Impregnation or coating of fibres or fabrics.—Koray, Ltd., and C. D. Moore. Feb. 6, 1946. 617,610.

Gas purification process.—Koppers Co., Inc. July 11, 1944. 617,780.

Process of recovering tungsten from tungsten carbide.—A. R. Globus. Feb. 14, 1946. 617,896.

Self-luminous compositions.—Thorium, Ltd., L. A. Levy, D. W. West, and W. P. Grove. April 2, 1946. 617,516.

Manufacture of aqueous dispersions of synthetic linear polyamides.—I.C.I., Ltd., (E. I. Du Pont de Nemours & Co.) April 17, 1946. 617,907.

Distributing flowable material, e.g., pulverulent materials, fluids and the like.—Dallow, Lambert & Co., Ltd., and F. Bingley. April 17, 1946. 617,908.

Stabilised compositions containing polymers which evolve hydrogen chloride on decomposition.—N.V. de Bataafsche Petroleum Maatschappij, P. G. Croft-White, and P. J. Garner. May 2, 1946. 617,620.

Hydro-forming or normal hexane.—Anglo-Iranian Oil Co., Ltd., and J. Owen, and O. M. K. Collis. [Legal representative of C. B. Collis (deceased).] July 5, 1946. 617,920.

Manufacture of ultramarine.—American Cyanamid Co. July 24, 1945. 617,522.

Production of secondary ultramarine from primary ultramarine.—American Cyanamid Co. July 24, 1945. 617,523.

Compositions adapted for use as a detergent, degreasing agent, and for softening water.—J. P. Cookshaw. July 17, 1946. 617,631.

Synthetic resinous compositions.—British Resin Products, Ltd., E. M. Evans, and J. F. Williams. July 26, 1946. 617,632.

Magnetic particles for crack-detecting fluids, the production of such particles, and fluids containing such particles. July 30, 1946. 617,792.

Production of glycerin and distilled fatty acids.—Procter & Gamble Co. Aug. 24, 1945. 617,929.

Continuous production of crude glycerin.—Procter & Gamble Co. Aug. 24, 1945. 617,930.

Manufacture of monoazo-dyestuffs.—Ciba, Ltd. Oct. 4, 1945. 617,799.

Arrangements for measuring or indicating the flow of liquids.—H. Kronberger. Oct. 1, 1946. 617,942.

Alternating-current arc welding.—Linde Air Products Co. Nov. 15, 1945. 617,644.

Method of stabilising halogenic-organic compounds.—Mathieson Alkali Works. Nov. 27, 1945. 617,572.

Manufacture of maleamic acid.—Beck, Koller & Co. (England), Ltd., R. S. Robinson, and E. L. Humburger. Oct. 8, 1946. 617,810.

Alloy for heat and corrosion resisting coating.—H. E. Gresham, M. A. Wheeler, and D. W. Hall. Oct. 9, 1946. 617,819.

Manufacture of dichlorovinyl ethers.—Ciba, Ltd. Oct. 19, 1945. 617,820.



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Insecticidal preparations.—Pal Chemicals, Ltd., and F. E. Smith. Oct. 11, 1946. 617,846.

Filters.—Sutcliffe, Speakman & Co., Ltd., and W. E. Edwards. Oct. 15, 1946. 617,677.

Electrodeposition of nickel on nickel.—Mond Nickel Co., Ltd. Oct. 25, 1945. 617,689.

Electric welding machines.—C.A.V., Ltd., G. T. Robertson, and A. J. Oatway. Oct. 21, 1946. 617,702.

Manufacture of articles from ferrous metal powders.—Metal-Gas Co., Ltd., and C. A. K. Bolton. Oct. 22, 1946. 617,849.

Rotary pumps for delivering liquids.—Megator Pumps & Compressors, Ltd., and F. W. McCombie. Nov. 1, 1946. 617,750.

Manufacture of plastic articles.—Australian Glass Manufacturers Co., Proprietary, Ltd. Dec. 11, 1945. 617,851.

Production of cellulose esters.—J. J. Allen, and J. A. Hawkes. Nov. 6, 1946. 617,931.

Artificial fertiliser compositions.—Osmotas, Ltd., and T. L. Harborne. Nov. 11, 1946. 617,854.

Method of concentrating substances in solution.—H. A. Noyes. Oct. 17, 1944. 617,858.

Method of obtaining concentrated

plant extracts from solutions.—H. F. Noyes. Oct. 17, 1944. 617,859.

Method of filtering by the use of ice particles.—H. A. Noyes. Oct. 17, 1944. 617,860.

Bright heat treatment of ferrous metals.—General Electric Co., Ltd., D. M. Dovey, and S. V. Williams. May 24, 1945. 618,048.

Separation of iron ores by froth flotation.—American Cyanamid Co. June 10, 1944. 617,958.

De-gasifying devices.—Soc. Anon. Solex. Aug. 7, 1944. 618,232.

Rectifiers for chloride salt baths for heat treatment of ferrous articles.—A. de F. Holden. Aug. 31, 1943. 617,961.

Production of salts of substituted dithiocarbamic acids and the treatment of gaseous, vaporous and liquid materials, particularly hydrocarbon materials containing carbon disulphide.—Yorkshire Tar Distillers, Ltd., D. W. Milner, and E. C. Holdsworth. Dec. 7, 1945. 617,969.

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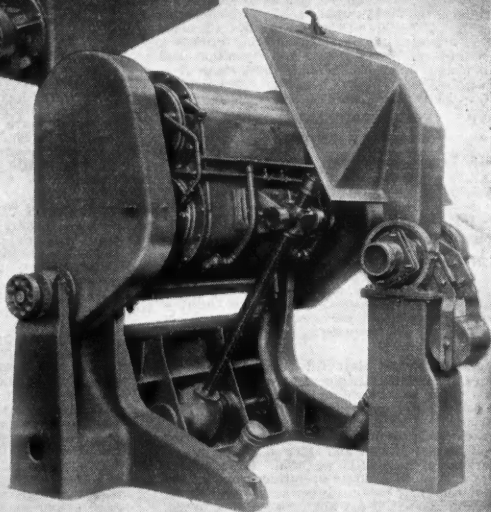
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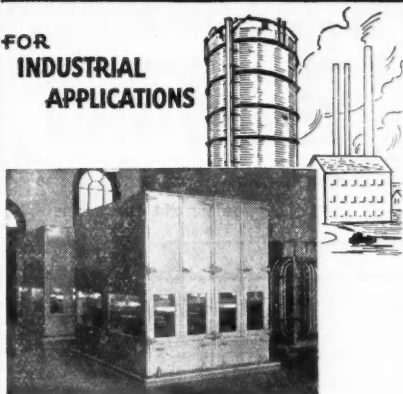
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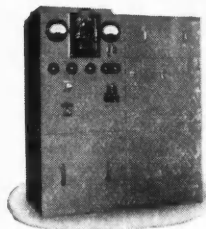
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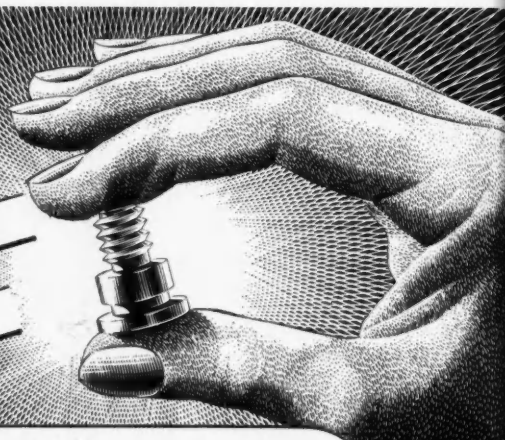
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